Terrestrial Mites of New York-III. The family Scutacaridae (Acarina)[1]

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Abstract: A taxonomic survey is presented of the family Scutacaridae of New York. 23 species and 2 subspecies are described and illustrated from the collections made at Long Island and eastern New York. Of these, 14 species of *Scutacarus* Gros, and 7 species and 1 subspecies of *Imparipes* Berlese are new to science, and 3 European species are new records. *Imparipes apicola* (Banks) is a new combination. The mites treated are mainly the free-living predaceous, or fungivorous species. 102 figures are presented.

This third report is part of a continuing survey of the terrestrial mites of New York. It contains descriptions and illustrations of 23 species and 2 subspecies of Scutacaridae from the collections made at Long Island and eastern New York. Of these, 14 species of *Scutacarus* Gros, and 7 species and 1 subspecies of *Imparipes* Berlese are new to science, and 3 European species—*Scutacarus* (*S.*) *acarorum* (Goez), *Imparipes degenerans italicus* Berlese and *I. obsoletus* Rack are new records.

Scutacarids are found in a wide variety of habitats—in commercial mushroom houses, compost, forest litter, soil, humus, manure, in small bird and mammal nests, in nest cells of bees and wasps, on insects as well as on other mites. An increasing number of species are being found associated with hymenopterous insects, especially bees (Batra, 1965; Mahunka, 1969; Baker & Delfinado, 1975; Eickwort, pers. corresp.). Although the associations are generally considered harmless to the insects (hosts), but beneficial to the mites, information on the true relationship (beyond phoresy, see Norton & Ide, 1974) between mites and insects is lacking.

The present paper deals mainly with the free-living predaceous, or fungivorous species; the next report in this series will include the phoretic scutacarids associated with hymenopterous insects.

Holotypes are deposited in the New York State Museum & Science Service

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collection at Albany and paratypes in the U.S. National Museum collection. We thank Mr. Roy Norton (State University of New York at Syracuse) for his taxonomic opinions and the gift of specimens; Dr. George Eickwort (Cornell University) for the loan of specimens taken from bees, and Dr. Herbert W. Levi (Museum of Comparative Zoology, Harvard) for the loan of the type of *Disparipes apicola* Banks.

Genus *Scutacarus* Gros

Scutacarus Gros, 1845, Bull. Soc. imp. Moscow 18(1): 414. Type-species, *Scutacarus femoris* Gros, 1845, by monotypy, = *Acarus acarorum* Goeze, 1780 (see Oudemans, 1937:816). Karafiat, 1959, Beitr. Syst. u. Ökol. Mitteleurop. Acarina 1(2): 655. Mahunka, 1965, Acta Zool. Acad. Sci. Hung. 11: 363

Disparipes Michael, 1884, J. Linn. Soc. Lond. 17: 390. Type-species, *Disparipes bombi* Michael, 1884, by monotypy.

The genus *Scutacarus* is distinguished in having 4-segmented leg IV, usually with short tibiotarsus bearing 7 setae (rarely 6) and without pretarsus, claws and empodium. Leg I is also 4-segmented, and may or may not have claws. There are always 4 solenidia of varying forms on tibiotarsus I.

The genus is worldwide in distribution and, at present, contains the majority of the described species of the family Scutacaridae. Mahunka (1965) presented a key to the world species. Eight species have previously been known from North America.

The 15 species presently described in this genus may be separated into 2 subgenera: subgenus *Variatipes* Paoli (without a claw on tibiotarsus I) and subgenus *Scutacarus* Gros (with a claw on tibiotarsus I).

Subgenus *Variatipes* Paoli

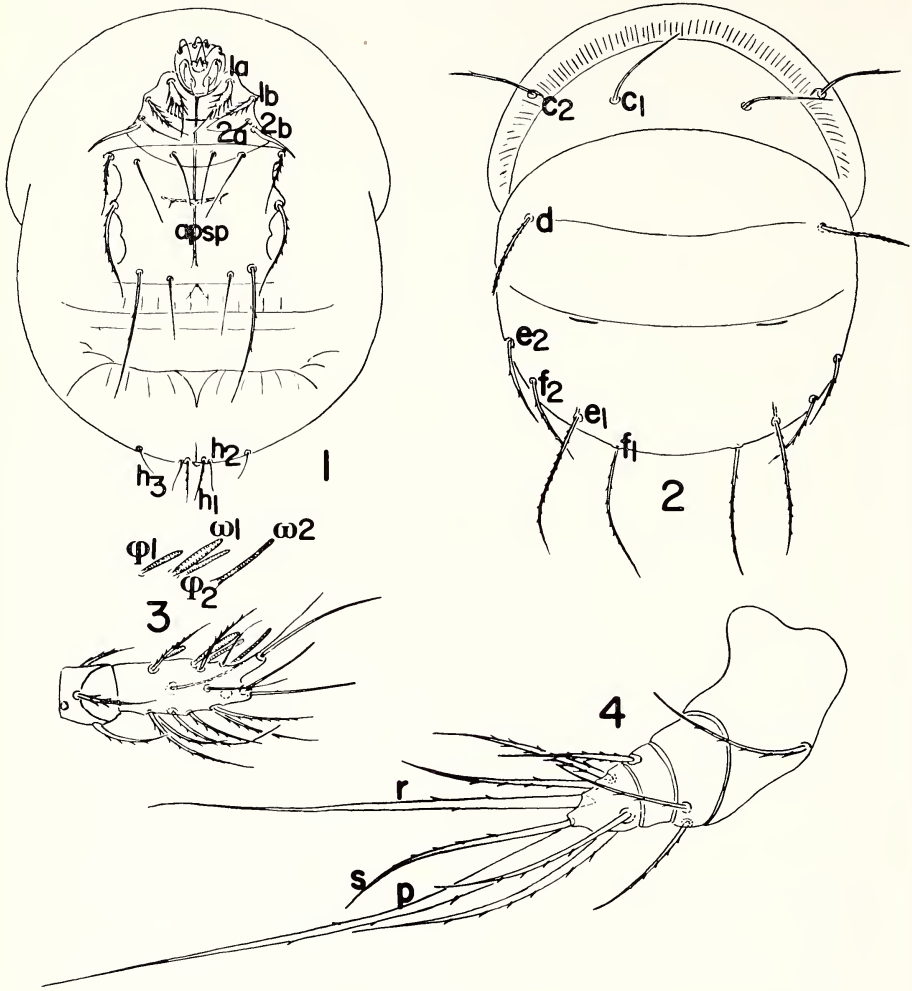
Variatipes Paoli, 1911, Redia 7(1): 222. Type-species, *Disparipes nudus* Berlese, 1886, by original designation.

Scutacarus, subgenus *Variatipes* Paoli, Karafiat, 1959, Beitr. Syst. u. Ökol. Mitteleurop. Acarina 1(2): 653.

The genus *Variatipes* was originally proposed by Paoli (1911) in the family Disparipedidae = Scutacaridae for species having "*Pedes primi paris unque destituti. Pedes postici ex quator articulis constituti, setis pluribus longis terminati.*" Karafiat (1959) recognized *Variatipes* as a subgenus of *Scutacarus* for species without a claw on tibiotarsus of leg I. We also consider these features as the diagnostic bases for the characterization of the subgenus *Variatipes*.

Scutacarus (*Variatipes*) **affinis**, n. sp.
(Figures 1–4)

Female (*Holotype*). Idiosoma 166 μ long, 134 μ wide, elliptical. Dorsum (fig. 2). Sensillus capitate, spiculate; prodorsal setae *pd1* and *pd2* not seen. Setae *c1* as long as



FIGS. 1–4. *Scutacarus* (*V.*) *affinis*, n. sp. 1. Female venter. 2. Female dorsum. 3. Genu, tibiotarsus and solenidia of leg I. 4. Leg IV.

c2, simple; *c2* barbed distally; *d* strong, barbed, as long as *e2* and *f2*, the latter sparsely barbed; *e1* and *f1* slender, barbed, longest of dorsal setae.

Venter (fig. 1). Posterior coxisternal plate more sclerotized and finely punctate than anterior coxisternal plate. Apodeme 2 well developed, attached to acetabula of leg II. Apodemes 1 and 3 and sternal apodeme (*apsa*) strong. Apodeme 4 not fully developed, weakly attached to acetabula of leg III; a small secondary apodeme visible below *ap4*. Sternal apodeme (*apsp*) with posterior end free. Epimeral setae *1a* large, strongly serrate; *1b* barbed at basal ½; *2a* slender, barbed at middle; *2b* slender, daggerlike, simple; *3a* as long as *3b*, slender, simple; *3c* barbed; *4a* as long as *4b*, simple; *4b* sparsely barbed, as strong as *4c* but longer; *4a* and *4b* arranged in a straight transverse row. Caudal setae

h2 and *h3* simple; *h1* sparsely barbed, stronger and longer than *h2* or *h3*; *h1* and *h2* approximate at their origins; *h3* distinct. Tibiotarsus of leg I as in figure 3. Solenidion ω_2 long and slender, rodlike; ω_1 club-shaped, shorter than ω_2; φ_2 similar to ω_2 but shorter; φ_1 swollen, shorter than φ_2. Tarsus II solenidion ω_1 same form and size as ω_1 of tibiotarsus I. Tibia II and III solenidion φ_1 small, club-shaped, and same size. Seta *d* of genu of leg I serrate. Leg IV as in figure 4. Tibiotarsus short, about as long as its basal width, with 7 sparsely barbed setae; seta *p* largest and longest of apical setae, bare at basal ½; *s* slender, short.

Male. Unknown.

Holotype. Female, Albany County Airport, New York, August 17, 1974, taken from litter in a wooded area near airport by M. D. Delfinado.

Paratype. 1 female, with same data as holotype.

Remarks. This species is similar to *quadrangularis* (Paoli) and **contiguus**, n. sp., in many respects. But **affinis**, n. sp. differs in having long dorsal setae *e1* and *f1*; strongly developed epimeral setae *1a* and *1b*, and slender solenidion φ_2 which is shorter than ω_2. Solenidion φ_2 is rodlike and very long, as long as ω_2 in *quadrangularis*; club-shaped and much shorter than in *contiguus*.

Scutacarus (*Variatipes*) **contiguus**, n. sp.
(Figures 5–8)

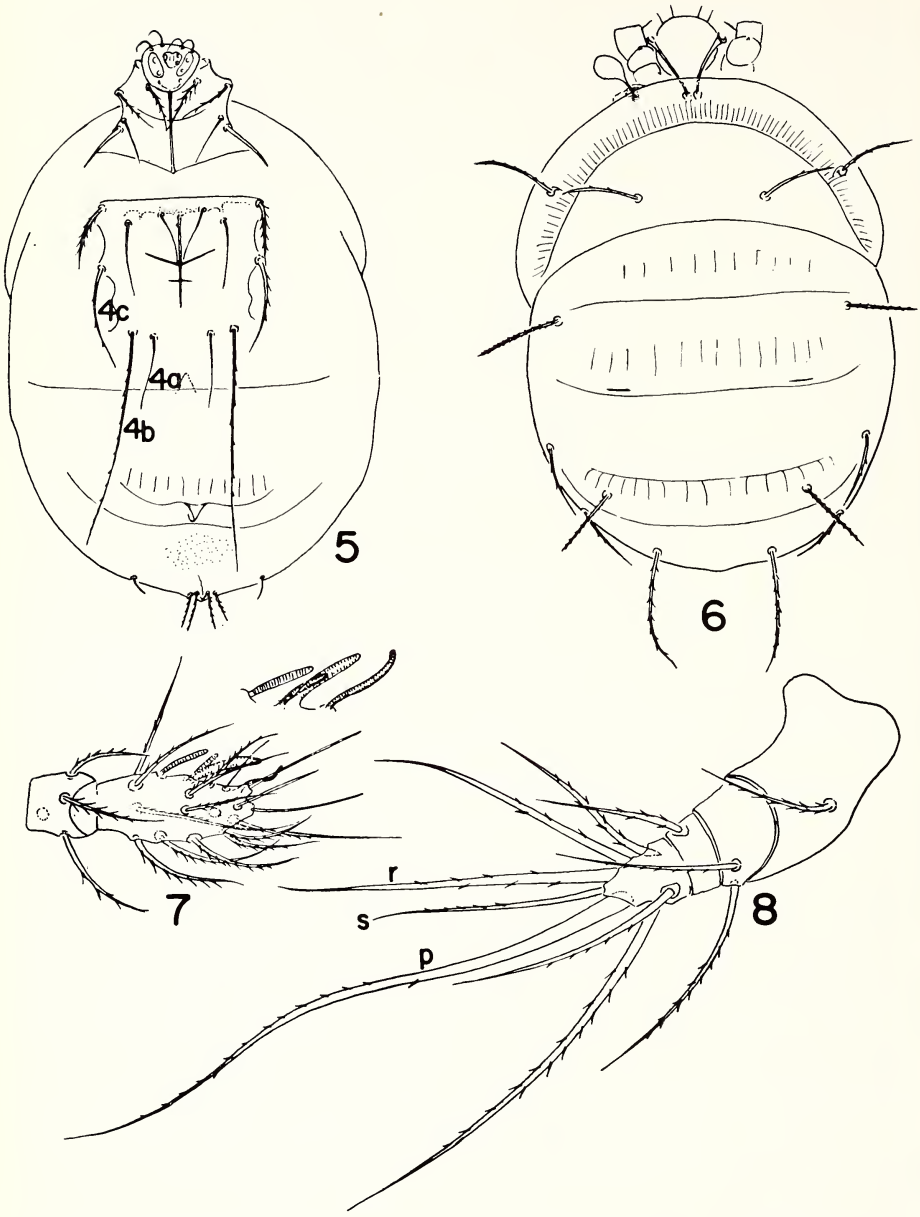
Female (*Holotype*). Idiosoma 191 μ long, 140 μ wide, narrow elliptical. *Dorsum* (fig. 6). Sensillus capitate, spiculate; prodorsal setae *pd1* and *pd2* not seen. Setae *c1* as long as *c2*, sparsely barbed; *d* as long as *e1*, moderately barbed; *e2* and *f2* sparsely barbed, fairly weak, shorter than *e1*; *f1* barbed, longest of dorsal setae.

Venter (fig. 5). Coxisternal plates well sclerotized and finely punctate. Apodeme 2 developed but weak, joining acetabula of leg II. Apodemes 1 and 2, and anterior apodeme (*apsa*) strong. Apodeme 4 incomplete, as short lateral extensions of sternal apodeme (*apsp*). Sternal apodeme (*apsp*) strong, with posterior end free. Epimeral setae *1a* similar to *1b*, slender, sparsely serrate; *2a* slender, simple, weak; *2b* daggerlike, simple; *3a* shorter than *3b*, simple; *3c* strong, serrate; *4a* short, about ⅓ as long as *4b*, simple; *4b* strong, sparsely serrate, long, almost reaching posterior margin of hysterosoma; *4c* sparsely serrate, ⅔ as long as *4b*; *4a* and *4b* arranged in a straight transverse row. Caudal setae *h1* and *h2* finely serrate, approximate at their origins; *h3* small, simple, shorter than *h1* and *h2*, distant. Tibiotarsus of leg I as in figure 7. Solenidion ω_2 very long and slender, recurved; ω_1 stout, about as long as ω_2; φ_1 and φ_2 club-shaped, short. Tarsus II solenidion ω_1 stout, similar to that on tibiotarsus I. Tibia II and III solenidion φ_1 small, club-shaped, that on tibia III much smaller. Leg IV as in figure 8. Tibiotarsus longer than its basal width, with 7 sparsely serrate setae; setae *s*, *r* and *p* as in **affinis**, n. sp.

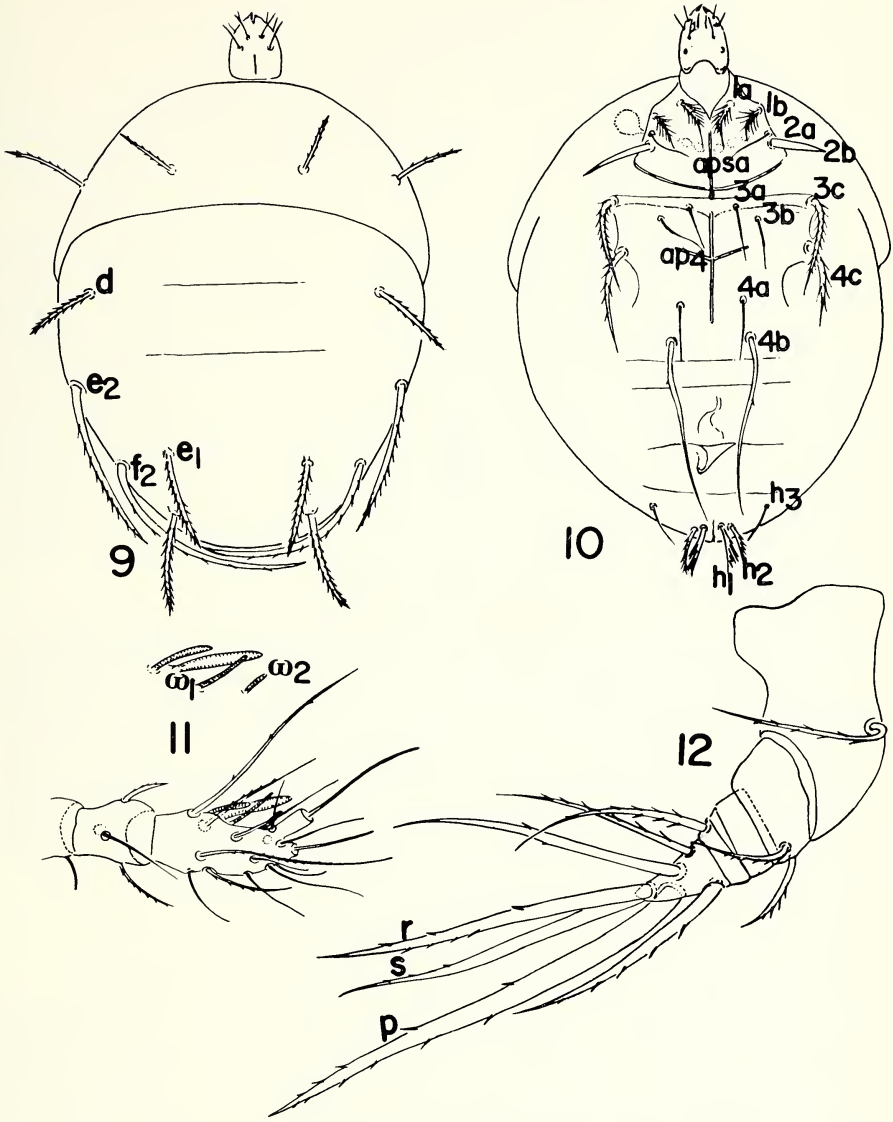
Male. Unknown.

Holotype. Female, Albany County Airport, New York, August 17, 1974, taken from litter in a wooded area on Shaker Road 1 mi west of airport by M. D. Delfinado.

Paratype. 1 female, with same data as holotype, but smaller—185 μ long, 128 μ wide; 1 female, Ellis Ringwood Preserve, New York, October 4, 1970 from center of decaying



FIGS. 5–8. *Scutacarus* (*V.*) *contiguus*, n. sp. 5. Female venter. 6. Female dorsum. 7. Genu, tibiotarsus and solenidia of leg I. 8. Leg IV.



Figs. 9–12. *Scutacarus* (*V.*) *jacoti*, n. sp. 9. Female dorsum. 10. Female venter. 11. Genu, tibiotarsus and solenidia of leg I. 12. Leg IV.

tree stump collected by G. R. Muller; 1 female, Ithaca, New York, May 8, 1974, from interior portion of nest of *Microtus pennsylvanicus* (Ord) collected by B. OConnor.

Remarks. The long, recurved solenidion ω_2 of tibiotarsus I and the long dorsal setae *f1* are distinctive for this new species.

Scutacarus (*Variatipes*) **jacoti**, n. sp.
(Figures 9–12)

Female (*Holotype*). Idiosoma 179 μ long, 140 μ wide, obovate.

Dorsum (fig. 9). Sensillus capitate, spiculate; prodorsal setae *pd1* and *pd2* not seen. All dorsal setae very strong; *c1* as long as *c2* and *d*, barbed; *e1* as long as *f1*, slightly longer than *d*, barbed; *e2* serrate, as strong as *f2* but shorter; *f2* strongest and longest of dorsal setae, serrate.

Venter (fig. 10). Coxisternal plates poorly sclerotized. Apodeme 2 not developed, hardly discernible. Apodeme 4 incomplete, seen as short lateral extensions of sternal apodeme (*apsp*). Apodemes 1 and 3, and sternal apodemes (*apsa*, *apsp*) very strong, the last with posterior end free. Epimeral setae *1a* and *1b* strongly pectinate; *2a* simple; *2b* robust, daggerlike, simple; *3a* as long as *3b*, simple, small; *3c*, *4c* strong, with strong serrations; *4a* simple, short, situated anterior to *4b*; *4b* very strong and long, reaching bases of caudal setae, smooth or barbed. Caudal setae *h1* large, plumose; *h2* similar to *h1* except smaller; *h3* simple, as long as *h1*, distant; *h1* and *h2* approximate at their origins. Tibiotarsus of leg I as in figure 11. Solenidion ω_2 very small; ω_1 large, club-shaped; φ_2 slender, rodlike, longer than φ_1; φ_1 club-shaped. Tarsus II solenidion ω_1 fairly stout. Tibia II and III solenidion φ_1 small, that on tibia III much smaller. Seta *d* of genu of leg I simple. Leg IV as in figure 12; tibiotarsus longer than its basal width, with 6 setae as shown in figure; setae *s*, *r* and *p* very strong and stout.

Male. Unknown.

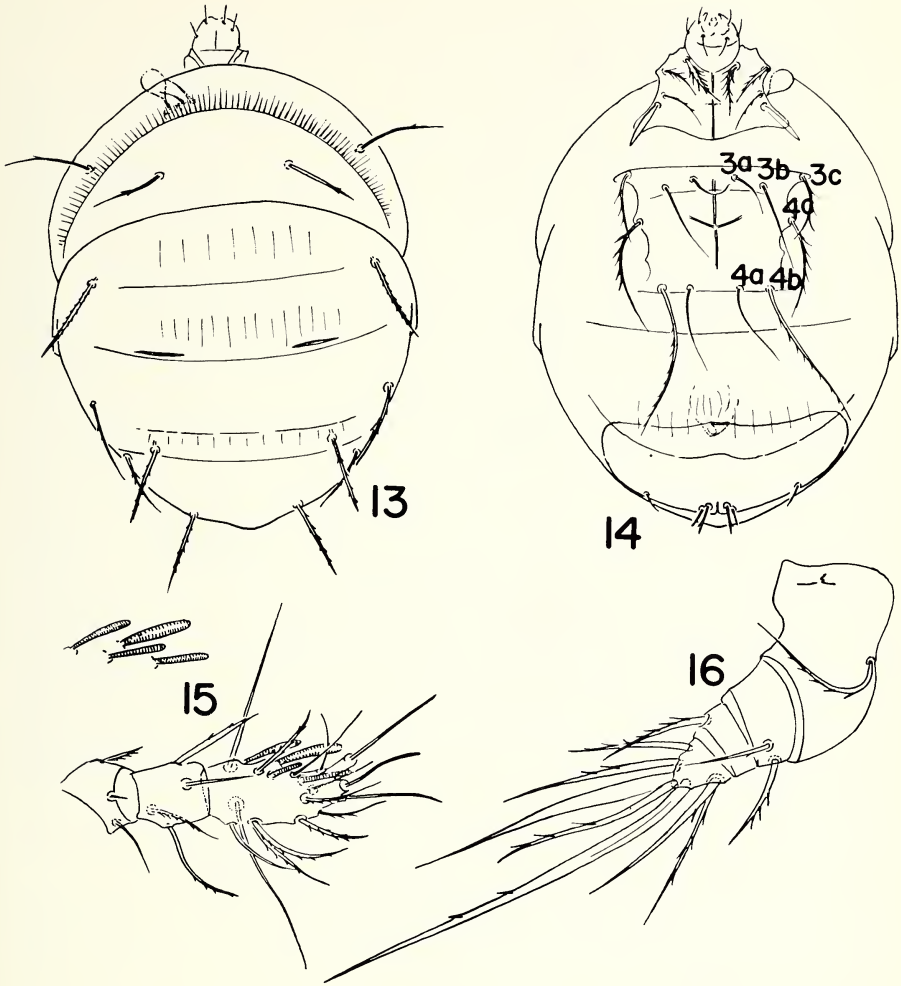
Holotype. Female (unique), boggy thickets 5 mi. east of Taborton, Rensselaer County, New York, August 5, 1974, taken from sphagnum moss by M. D. Delfinado. The moss was kindly given to us by Mr. S. J. Smith (Botanist, New York State Museum & Science Service at Albany).

Remarks. *S.* **jacoti** differs from other members of the subgenus *Variatipes* in several respects: epimeral setae *4b* are very strong, long and not in line with setae *4a*; solenidion ω_1 of tibiotarsus I is very small, and dorsal setae *f2* are well developed and long. An interesting feature of this species is the presence of 6 setae on the tibiotarsus of leg IV.

Scutacarus (*Variatipes*) **uniformis**, n. sp.
(Figures 13–16)

Female (*Holotype*). Idiosoma 179 μ long, 134 μ wide, obovate.

Dorsum (fig. 13). Sensillus capitate, smooth (?); prodorsal setae *pd1* and *pd2* minute, setiform. Setae *c1* as long as *c2* with 1–2 barbs at middle; *d* barbed, as long as *e1* and *f1* but stronger; *e2* and *f2* slender, sparsely barbed. *Venter* (fig. 14). Coxisternal plates poorly sclerotized. Apodeme 2 not developed, hardly discernible. Apodemes 1 and 3, and sternal apodemes (*apsa*, *apsp*) very strong. Apodeme 4 incomplete, with no trace of attachment to acetabula of leg III; a small secondary apodeme visible below *ap4*. Sternal apodeme (*apsp*) with posterior end free. Epimeral setae *1a* large, plumose; *1b* similar to *1a* except smaller; *2a* slender, barbed; *2b* daggerlike, smooth; *3a* and *3b* simple, the latter about ⅓ longer; *4a* simple, slender, about ⅔ as long as *4b*; *4c* barbed, as long as *4a* but stronger; *4b* very long but not reaching bases of caudal setae, barbed; *4a* and *4b* arranged in a straight transverse row. Caudal setae *h1* strong, barbed at middle; *h2* and *h3* simple, slender and shorter than *h1*; *h3* distant; *h1* and *h2* approximate at their origins. Tibiotarsus of leg I as in figure 15. Solenidion ω_2 rodlike, as long as ω_1; ω_1 stout,

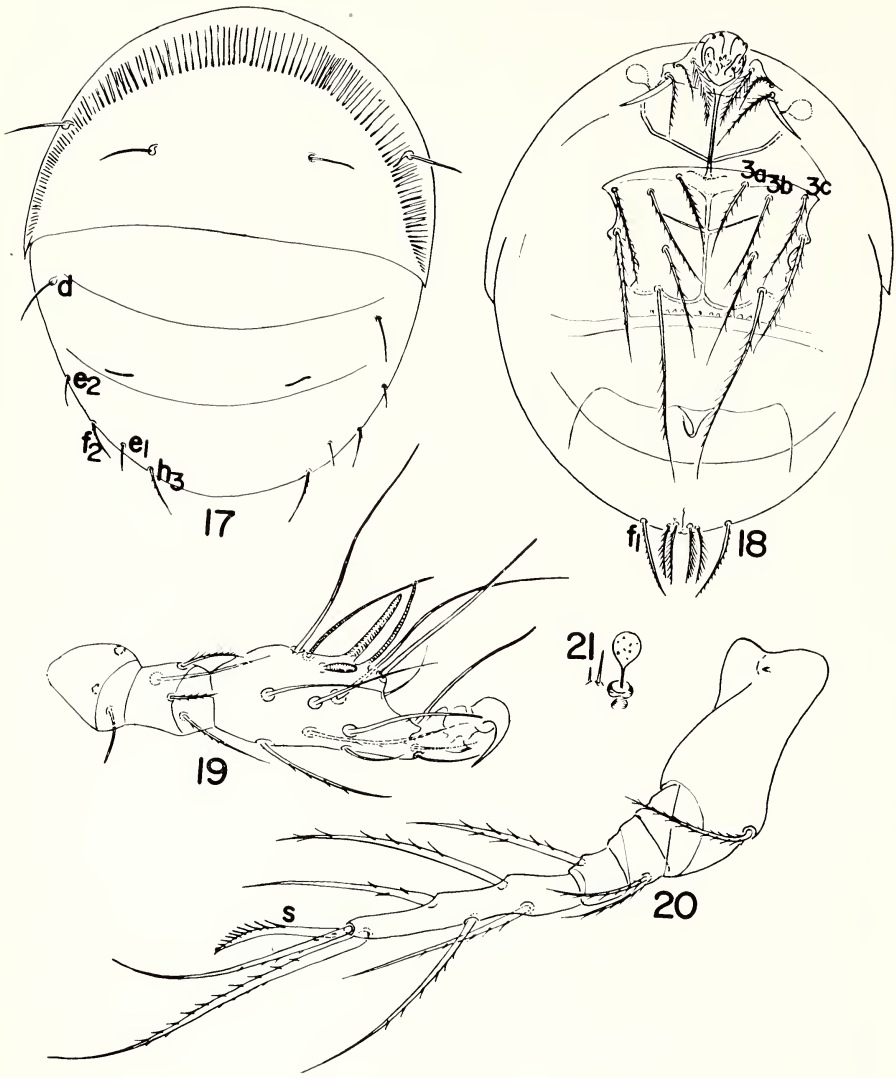


Figs. 13–16. *Scutacarus* (*V.*) *uniformis*, n. sp. 13. Female dorsum. 14. Female venter. 15. Femur, genu, tibiotarsus and solenidia of leg I. 16. Leg IV.

club-shaped; φ_2 similar to ω_2; φ_1 slightly swollen distally; longer than φ_2. Tarsus II solenidion ω_1 same form as ω_1 of tibiotarsus I except smaller. Tibia II and III solenidion φ_1 small, club-shaped, that on tibia III much smaller. Seta *d* of genu of leg I simple. Leg IV as in figure 16. Tibiotarsus very short, shorter than its basal width, with 7 sparsely barbed setae except *r*.

Male. Unknown.

Holotype. Female (unique), Farmingdale, Long Island, New York, June 30, 1973, from a bird nest collected by M. D. Delfinado and M. J. Abbatiello.



FIGS. 17–21. *Scutacarus* (*S.*) *fimetarius*, n. sp. 17. Female dorsum. 18. Female venter. 19. Femur, genu, tibiotarsus and solenidia of leg I. 20. Leg IV. 21. Sensillus prodorsal setae *pd1* and *pd2*.

Remarks. S. **uniformis** n. sp. is similar to **affinis**, n. sp. and **contiguus**, n. sp., differing essentially by the relative lengths of the setae on the dorsum of idiosoma and on tibiotarsus of leg IV, and by the size and the form of solenidion ω_2 of tibiotarsus I. *S.* **uniformis** has uniformly short dorsal setae and much shorter setae on the tibiotarsus of leg IV than any other species known in the group. Also solenidion ω_2 is shorter than that of *affinis* or *contiguus*.

Subgenus *Scutacarus* Gros

Scutacarus (*Scutacarus*) **fimetarius**, n. sp.

(Figures 17–21)

Female (*Holotype*). Idiosoma 255 μ long, 217 μ wide, elliptical.

Dorsum (fig. 17). Sensillus capitate, spiculate; prodorsal setae spinelike, *pd2* about ½ as long as *pd1*. Setae *c1* and *c2* strong, simple; *c1* shorter than *c2*; *d* as long as *c1*, simple; *e1* as long as *e2*, fairly weak, simple; *f2* shorter than *f1*, barbed; *f1* strongest of dorsal setae, barbed.

Venter (fig. 18). Anterior coxisternal plate not as sclerotized as posterior coxisternal plate. Apodeme 2 poorly developed, appearing as weak, curved line below apodeme 1. Apodeme 4 incomplete, seen as short lateral extensions of posterior apodeme (*apsp*) (in some paratype specimens apodeme 4 may appear faintly connected to acetabula of leg III). Sternal apodemes (*apsa*, *apsp*) strong, the posterior end of *apsp* extending to acetabula of leg IV. Epimeral setae *1a* large, thickly barbed; *1b* and *2a* similar to *1a* but moderately barbed and not as large; *2b* saberlike, smooth; *3a*, *3b* and *3c* as long as *4a*, barbed; *4a* inserted anterior to *4b*, barbed; *4c* as strong as *4b* but shorter; *4b* very long but not reaching bases of caudal setae. Caudal setae *h1* and *h2* plumose, approximate at their origins; *h3* sparsely barbed, distant. Tibiotarsus of leg I as in figure 19. Solenidia ω_2 and φ_1 very long, slender; ω_1 stout, tapering distally; φ_2 small, club-shaped. Tarsus II solenidion ω_1 same form as ω_1 of tibiotarsus I but smaller. Tibia II and III solenidion φ_1 small, club-shaped, same size. Leg IV as in figure 20, with long, slender tibiotarsus, about as long as length of trochanter, with 7 setae. Seta *s* very short, about ½ as long as *r* and strongly serrate at distal half.

Male. Unknown.

Holotype. Female, Coeymans, Rt. 143, New York, July 7, 1974, from pasture manure collected by M. D. Delfinado.

Paratypes. 53 females, with same data as holotype; 35 females, Fran Mushroom Co., Ravena, New York, July 11, 1974, from compost and straw collected by M. D. Delfinado.

Remarks. This species is similar to *S.* **mahunkai**, n. sp. in many respects. Both are characterized in part by having long and slender tibiotarsus IV, very long rodlike solenidia ω_2 and φ_1 of tibiotarsus I, and strongly developed posterior sternal apodeme (*apsp*) connected to the acetabula of leg IV. *S.* **fimetarius**, however, is distinguished in having a poorly developed apodeme 2, small solenidion φ_2 of tibiotarsus I and short epimeral setae *4b*. Also the corresponding apical setae *r*, *s* and *p* of tibiotarsus IV are distinctive in **fimetarius**.

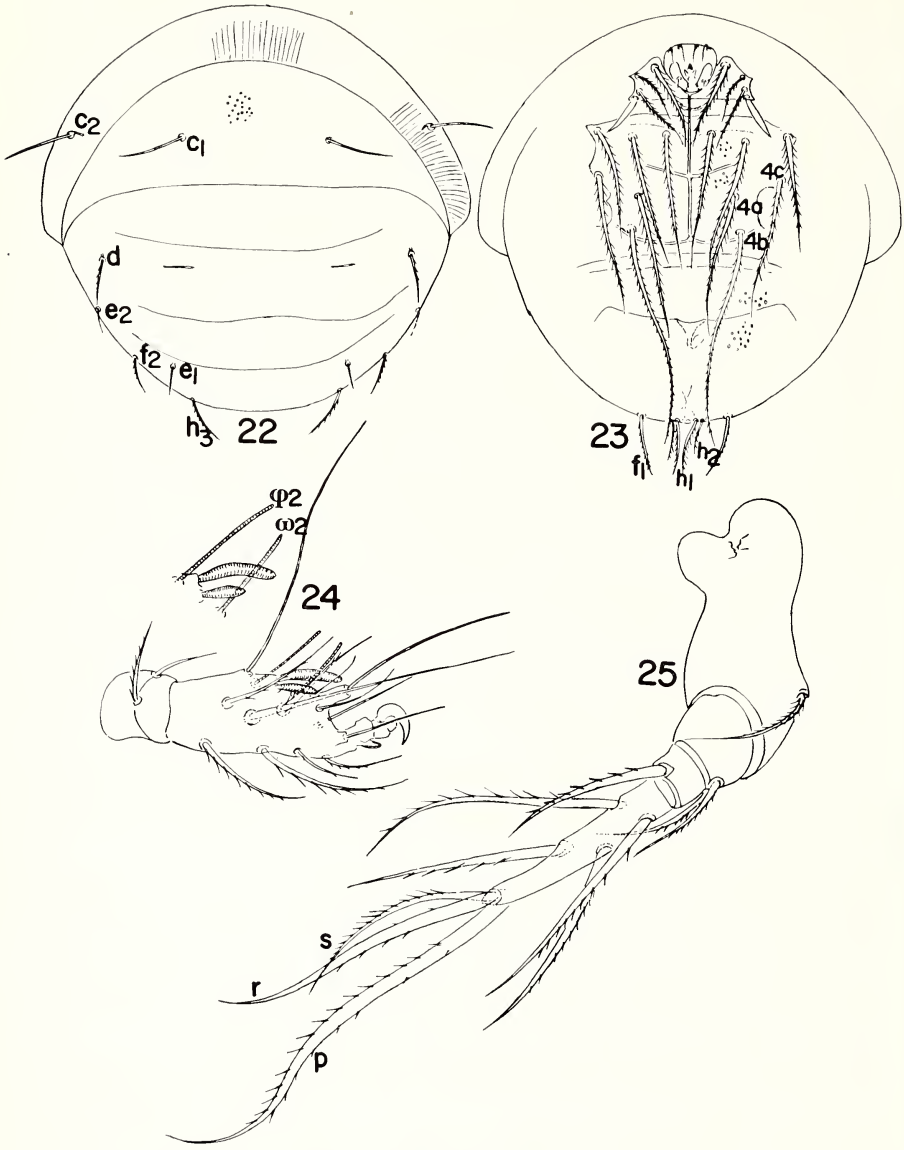
Scutacarus (*Scutacarus*) **mahunkai**, n. sp.

(Figures 22–25)

Female (*Holotype*). Idiosoma 223 μ long, 226 μ wide, broadly elliptical.

Dorsum (fig. 22). Sensillus capitate, spiculate(?); prodorsal setae *pd1* and *pd2* minute, spinelike. Setae *c1* similar to *c2*, strong, simple; *d* as strong as *f2*, barbed; *e1* and *e2* simple, as long as *f2*; *f1* strongest of dorsal setae.

Venter (fig. 23). Anterior and posterior coxisternal plates as in **fimetarius**, n. sp. Apodeme 2 not fully developed, appearing as short lateral extensions of anterior sternal apodeme (*apsa*). Apodeme 4 incomplete, with free ends approaching acetabula of leg III. Sternal



FIGS. 22–25. *Scutacarus* (*S.*) *mahunkai*, n. sp. 22. Female dorsum. 23. Female venter. 24. Genu, tibiotarsus and solenidia of leg I. 25. Leg IV.

apodemes (*apsa*, *apsp*) very strong, especially *apsp* with posterior end extending to acetabula of leg IV. Epimeral setae *1a* large, strong, barbed; *1b* and *2a* similar to *1a* but much smaller; *2b* robust, saberlike, smooth; *3a*, *3b* and *3c* equally long, barbed, arranged in a straight transverse row; *4a* as long as *4c*, inserted anterior to *4b*, barbed; *4b* very long, reaching posteriorly beyond margin of hysterosoma, barbed. Caudal setae

h1, as strong as *h3*, barbed; *h2* shorter than *h1*, sparsely barbed; *h3* distant; *h1* and *h2* approximate at their origins. Tibiotarsus of leg I as in figure 24. Solenidia ω_2 and φ_1 very long, slender; ω_1 stout, large; φ_2 small, club-shaped. Tarsus II solenidion ω_1 same form as ω_1 of tibiotarsus I but smaller. Tibia II and III solendion φ_1 not seen. Leg IV as in figure 25; tibiotarsus long and slender, about as long as length of trochanter, with 7 setae. Seta *s* short about ⅔ as long as *r*, serrate to near base; setae *r* and *p* sparsely serrate.

Male. Unknown.

Holotype. Female (unique), Ausable, Champlain Region, New York, September 14, 1973, taken from weeds mixed with soil on roadside by M. D. Delfinado.

Remarks. *S.* **mahunkai,** n. sp. and **fimetarius**, n. sp. are closely related and appear to belong to the *longitarsus* complex by the long tibiotarsus of leg IV, by the form of the solenidia on tibiotarsus of leg I, and by the position of caudal setae *h1*, *h2* and *h3*. These two species may be separated most easily by the length of the sternal setae *4b* and by the development of apodeme *2*. In **fimetarius** setae *4b* are short, not reaching beyond the posterior margin of the hysterosoma; in **mahunkai** these setae are very long, extending beyond the posterior margin of the hysterosoma. The apodeme *2* in **fimetarius**, is poorly developed, appearing as a thin line joining the acetabula of leg II whereas in **mahunkai** apodeme *2* appears as very short, thick lateral extensions of the sternal apodeme (*apsp*) and is free from the acetabula of leg II.

Scutacarus (*Scutacarus*) *acarorum* (Goeze)
(Figures 26–31)

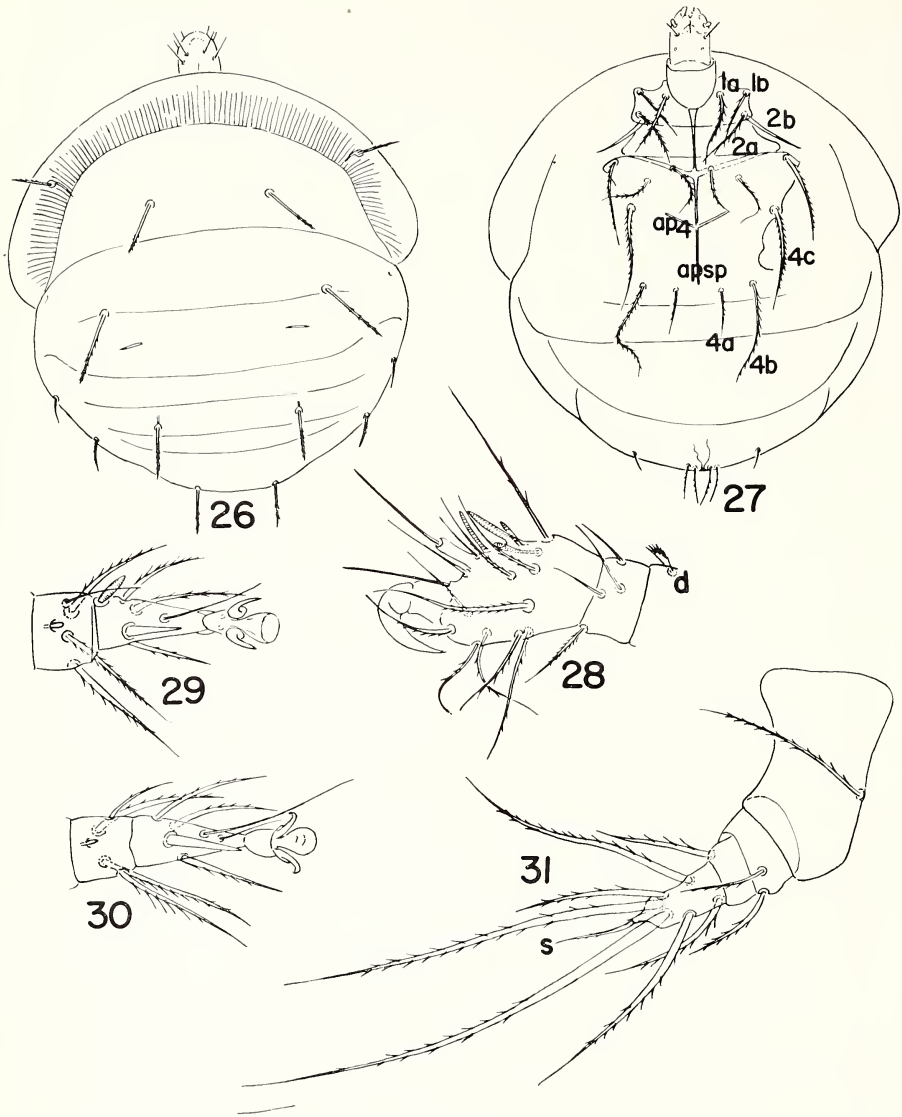
Acarus acarorum Goeze, 1780, Neu entdeckte Theile an Ins., p. 97 (cited from Oudemans, 1937).

Scutacarus acarorum, Karafiat, 1959, Beitr. Syst. u. Ökol. Mitteleurop. Acarina 1(2): 651.

Female. Idiosoma 223 μ long, 220 μ wide, elliptical.

Dorsum (fig. 26). Sensillus capitate, with a few spicules; prodorsal setae *pd1* and *pd2* not seen. Setae *c1* longer and stronger than *c2*, barbed; *d* strongest and longest of dorsal setae; *e1* as strong and as long as *f1*, barbed; *e2* and *f2* short, the former simple and weak, the latter sparsely barbed and stronger.

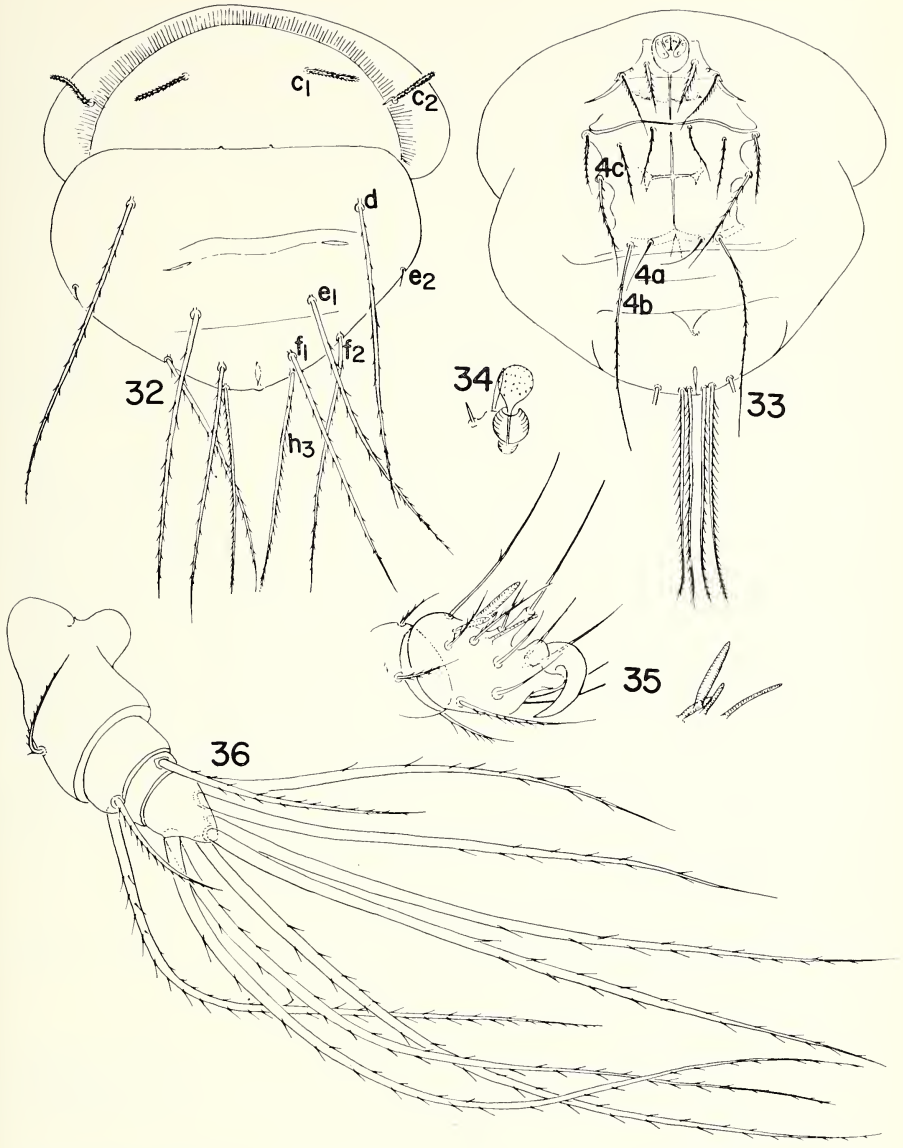
Venter (fig. 27). Coxisternal plates finely punctate. Apodeme *2* poorly developed, appearing as thin line extending to acetabula of leg II. Posterior sternal apodeme (*apsp*) strong, with free end reaching posteriorly to level of bases of setae *4a*. Apodeme 4 incomplete, free; a small secondary apodeme present below *ap4*. Epimeral setae *1a* strong, barbed; *1b* and *2a* similar to *1b* except smaller; *2b* daggerlike, smooth; *3a* short, as long as *3b*, barbed; *3c* as strong as *4c* but shorter; *4a short*, about ½ as long as *4b*, sparsely barbed at middle. Caudal setae *h1* similar to *h2*, slender, sparsely barbed, approximate at their origins; *h3* very small, weak, simple, distant. Tibiotarsus, femur and genu of leg I as in figure 28. Solenidion ω_2 slender, straight; ω_1 stout, tapered distally; φ_1 and φ_2 short, club-shaped. Seta *d* of femur I short, broadened and pectinate distally. Tarsus II (fig. 29) solenidion ω_1 stout. Tibia II and III (fig. 30) solenidion φ_1 very small, peglike. Leg IV as in figure 31. Tibiotarsus elongate, about twice as long as its basal width, with 7 setae, characteristically produced apically bearing a very short, slender seta *s*.



Figs. 26–31. *Scutacarus* (*S.*) *similis*, n. sp. 26. Female dorsum. 27. Female venter. 28. Femur, genu and tibiotarsus I. 29. Tibia and tarsus of leg II. 30. Tibia and tarsus of leg III. 31. Leg IV.

Male. Unknown.

Material examined. 1 female, Kerner, New York, June 1928, taken from a bumble bee by M. D. Delfinado (on same slide with paratypes of *Kuzinia americana* Baker and Delfinado); 1 female, 1.45 km. NE of Varna, New York, September 8, 1973, taken from



Figs. 32–36. *Scutacarus* (*S.*) *formosus*, n. sp. 32. Female dorsum. 33. Female venter. 34. Sensillus and prodorsal setae *pd1* and *pd2*. 35. Genu, tibiotarsus and solenidia of leg I. 36. Leg IV.

a bumble bee by B. OConnor; 1 female, Jamestown, New York, August 31, 1940, from petiole of *Bombus americanorum* by R. E. Crabill.

Remarks. S. acarorum (Goeze) may be distinguished in having an elongate tibiotarsus IV which is produced apically and bears a short, slender seta *s*, and by the characteristic development of seta *d* on the femur of leg I. The latter feature is also found in the *baculitarsus* complex, but the tibiotarsus IV is much more elongate and the caudal setae *h1*, *h2* and *h3* are well separated at their origins.

Scutacarus (*Scutacarus*) **formosus**, n. sp.
(Figures 32–36)

Female (*Holotype*). Idiosoma 230 μ long, 242 μ wide, broadly obovate.

Dorsum (fig. 32). Sensillus capitate, spiculate; prodorsal setae spinelike, *pd1* more robust and longer than *pd2* (fig. 34). Setae *c1* as long as *c2* stout, thickly covered with short bristles; *d*, *e1*, *f1* and *f2* extremely long, about ⅔ as long as length of idiosoma, sparsely barbed; *e2* minute, simple.

Venter (fig. 33). Coxisternal plates well sclerotized, finely punctate. Apodeme 2 poorly developed, appearing as thickened curved line joining acetabula of leg II. Apodeme 4 incomplete, seen as short, lateral extensions of sternal apodeme (*apsp*); a small secondary apodeme fairly discernible below *ap4*. Posterior sternal apodeme (*apsp*) very strong, with posterior end extending to acetabula of leg IV. Epimeral setae *1a* large, pectinate; *1b* small, barbed; *2a* as long as *1a*, slender, barbed; *2b* large, saberlike; *3a*, *3b* and *3c* same length, sparsely barbed; *4a* very short, simple; *4b* very long, extending beyond margin of hysterosoma; *4a* and *4b* arranged in a straight transverse row along margin of posterior coxisternal plate. Caudal setae *h1*, *h2* and *h3* very long, about as long as length of dorsal setae *f1*, barbed; *h1* and *h2* approximate at their origins; *h3* distant. Tibiotarsus and solenidia of leg IV as in figure 35. Solenidion ω_2 long and slender; ω_1 large; φ_1 small, club-shaped; φ_2 as long as φ_1, slender. Tarsus II solenidion ω_1 club-shaped, slightly smaller than ω_1 of tibiotarsus I. Tibia II and III solenidion φ_1 not seen. Leg IV as in figure 36. Tibiotarsus slightly longer than its basal width, with 7 very long setae; seta *s* as long as *r* and *p*.

Male. Unknown.

Holotype. Female, Rt. 9, New Baltimore, New York, July 16, 1974, from pine debris collected by M. D. Delfinado.

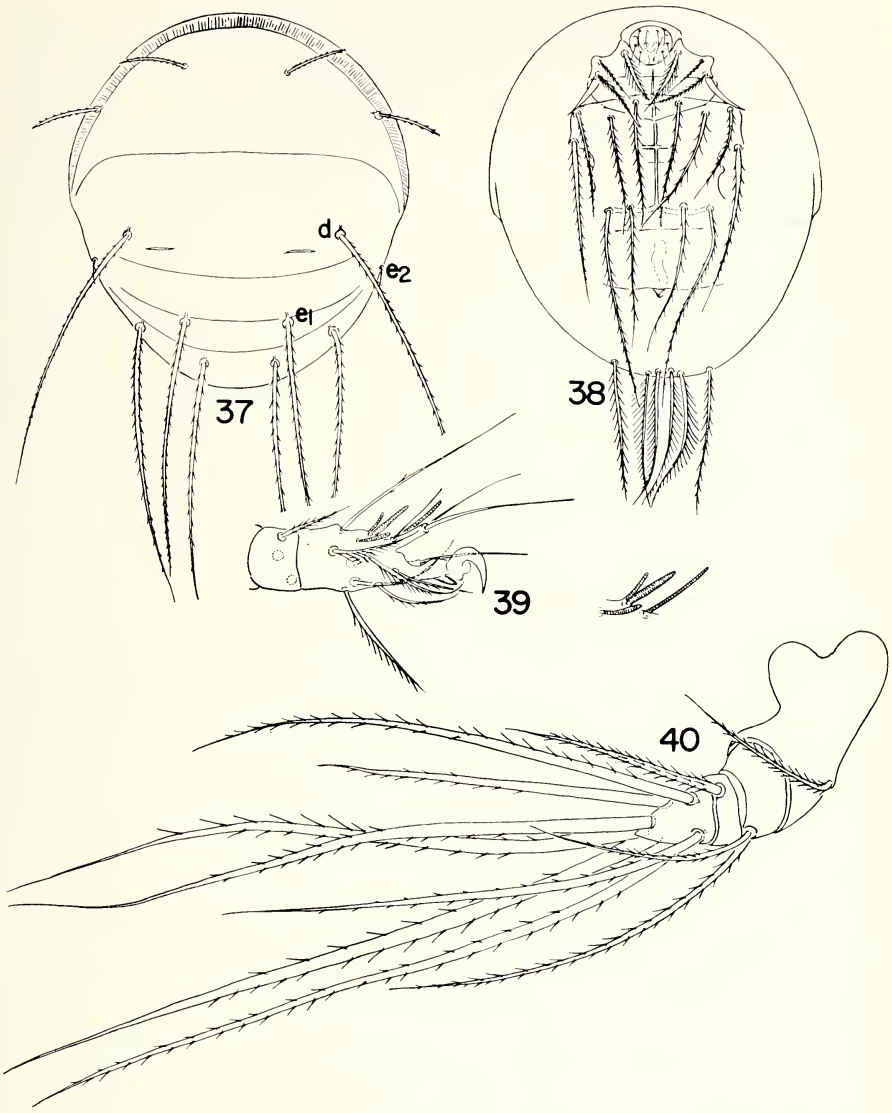
Paratype. 1 female, with same data as holotype.

Remarks. S. **formosus**, n. sp. is similar to *S.* **pectinatus**, n. sp. in having extremely long dorsal setae *d*, *e1*, *f1* and *f2* and epimeral setae *4b*, and tiny setae *e2*. But **formosus** can be easily recognized by the uniformly developed caudal setae *h1*, *h2* and *h3*, and by the stout dorsal setae *c1* and *c2*.

Scutacarus (*Scutacarus*) **pectinatus**, n. sp.
(Figures 37–40)

Female (*Holotype*). Idiosoma 217 μ long, 191 μ wide, obovate.

Dorsum (fig. 37). Sensillus capitate, spiculate (?); prodorsal setae spinelike *pd1* as long as *pd2* but more robust. Type of dorsal setae as in **formosus**, n. sp. except *c1* and *c2* moderately barbed and *f1* stronger; *e2* tiny as in **formosus**.



Figs. 37–40. *Scutacarus* (*S.*) *pectinatus*, n. sp. 37. Female dorsum. 38. Female venter. 39. Genu, tibiotarsus and solenidia of leg I. 40. Leg IV.

Venter (fig. 38). Posterior coxisternal plate more sclerotized than anterior coxisternal plate, punctate. Apodeme 2 poorly developed as weak curved line connected to acetabula of leg II. Apodeme 4 incomplete, free. Posterior sternal apodeme (*apsp*) strong, connected posteriorly to acetabula of leg IV. Epimeral setae *1a* large, strongly plumose; *1b* smaller than *2a*, barbed; *2b* large, saberlike, smooth; *3a* as long as *3b* and *3c*,

strong, barbed; *4a* as strong as *4b*, long, reaching bases of caudal setae *h1* and *h2*, barbed; *4b* very long, extending beyond margin of hysterosoma, barbed; *4c* similar to *4b* but shorter. Caudal setae *h1* and *h2* well developed, thickly feathered, approximate at their origins; *h3* as long as *h1* and *h2*, barbed, distant. Tibiotarsus of leg I as in figure 39. Solenidion ω_2 long, slender, rodlike; ω_1 stout, shorter than ω_2; φ_1 club-shaped, longer than slender φ_2. Tarsus II solenidion ω_1 stout, club-shaped. Tibia II solenidion φ_1 similar to ω_1 of tarsus II but slender and shorter. Tibia III solendion φ_1 not seen. Leg IV as in figure 40; tibiotarsus slightly longer than its basal width; seta *s* as long as setae *r* and *p*.

Male. Unknown.

Holotype. Female, near Flanders, Long Island, New York, July 16, 1973, from litter collected by M. D. Delfinado and M. J. Abbatiello.

Paratypes. 13 females with same data as holotype; 3 females, Adirondack Mts., Champlain Region, September 15, 1973, taken from soil and pine litter on roadside along Rt. 87 by M. D. Delfinado.

Remarks. The large, thickly feathered caudal setae *h1* and *h2* will readily separate **pectinatus**, n. sp. from its closely related species, **formosus**, n. sp.

Scutacarus (*Scutacarus*) **communis**, n. sp.
(Figures 41–44)

Female (*Holotype*). Idiosoma 255 μ long, 243 μ wide, obovate.

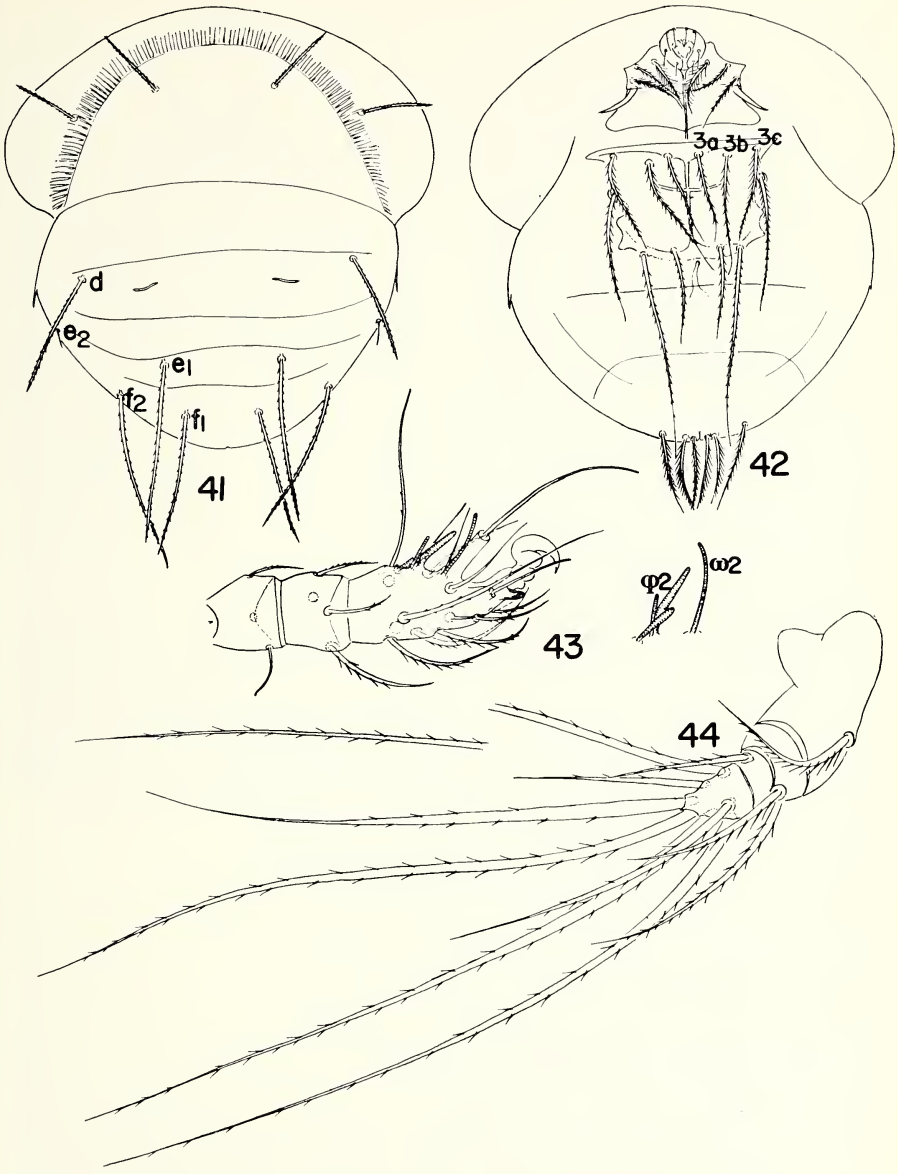
Dorsum (fig. 41). Sensillus capitate, spiculate; prodorsal setae *pd1* and *pd2* strong, spinelike. Type of dorsal setae as in **pectinatus**, n. sp. except setae *d*, *e1*, *f1* and *f2* shorter, about ½ as long as idiosoma; *e2* tiny as in **pectinatus**.

Venter (fig. 42). Coxisternal plates well sclerotized, punctate. Apodeme 2 not developed, hardly discernible. Apodeme 4 incomplete, seen as short lateral extensions of posterior sternal apodeme (*apsp*). Posterior sternal apodeme (*apsp*) strong, with posterior and extending to acetabula of leg IV; a small secondary apodeme present below *ap4*. Epimeral setae *1a* large, plumose; *1b* similar to *2a*, barbed; *2b* large, saberlike; *3a* slightly longer than *3b* and *3c*, barbed; *4a* short, about ½ as long as *4b*, barbed; *4b* very long, reaching beyond posterior margin of hysterosoma, barbed. Caudal setae *h1* and *h2* feathered, shorter than *h3*, approximate at their origins; *h3* barbed, distant. Tibiotarsus of leg I as in figure 43. Solenidion ω_2 very long, slender; ω_1 stout, almost tapered distally; φ_2 small, rodlike; φ_1 club-shaped. Tarsus II solenidia ω_1 similar to ω_1 of tibiotarsus I. Tibia II solenidion φ_1 very small, club-shaped. Tibia III solenidion φ_1 not seen. Leg IV as in figure 44. Tibiotarsus slightly longer than its basal width; seta *s* shorter than *p* and *r*.

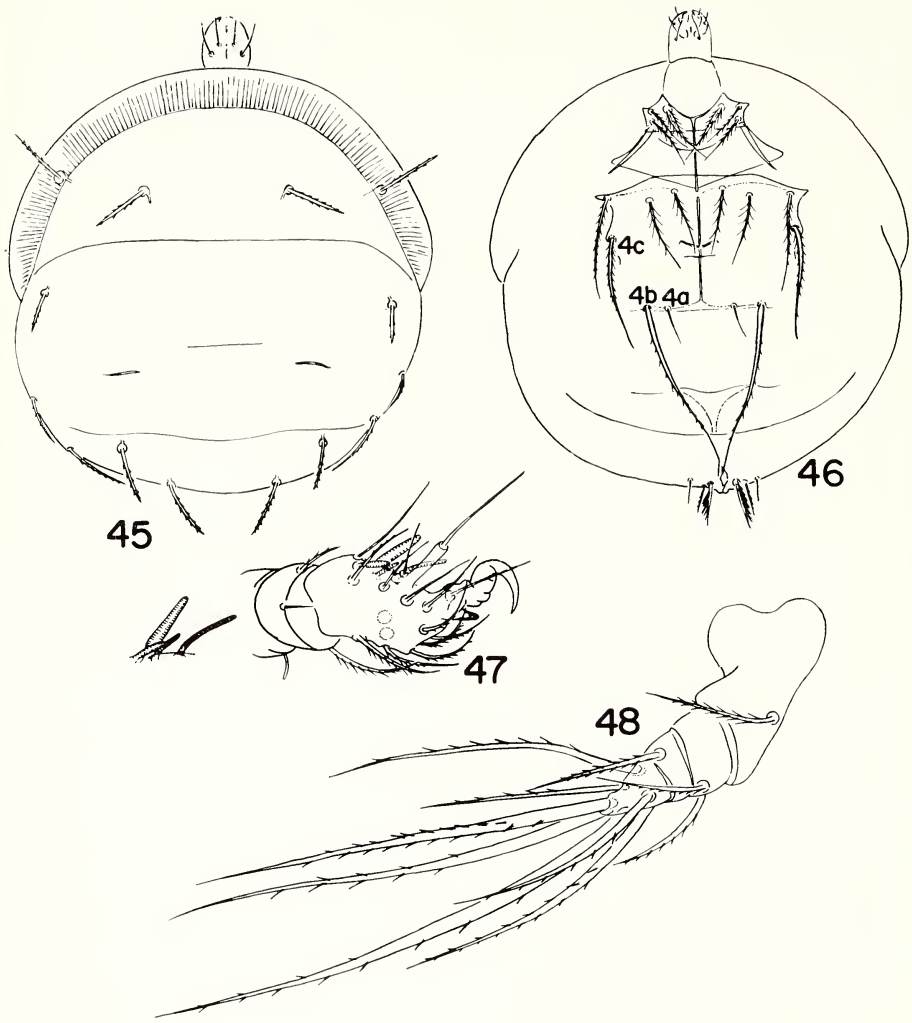
Male. Unknown.

Holotype. Female, Ausable, Champlain Region, New York, September 14, 1973, collected from moss by M. D. Delfinado.

Paratypes. 11 females with same data as holotype; 3 females, near Bolton Landing, Lake George, New York, August 8, 1973, collected from bark and soil at base of a tree; 1 female, Minerva Lake, Adirondack Mts., New York, September 29, 1973, collected from moss; 2 females, Crescent, Mohawk Valley, New York, October 4, 1973, taken from rotten log; 2 females, boggy thickets 5 mi east of Taborton, Rensselaer County, New York,



Figs. 41–44. *Scutacarus* (*S.*) *communis*, n. sp. 41. Female dorsum. 42. Female venter. 43. Femur, genu, tibiotarsus and solenidia of leg I. 44. Leg IV.



FIGS. 45–48. *Scutacarus* (*S.*) *pedestris*, n. sp. 45. Female dorsum. 46. Female venter. 47. Genu, tibiotarsus and solenidia of leg I. 48. Leg IV.

August 5, 1974, taken from liverwort; 2 females, Cedarville Swamp, Herkimer County, New York, August 8, 1974, taken from liverwort. All mite specimens were collected by means of Berlese funnels by M. D. Delfinado. The liverwort material was collected by Mr. S. J. Smith (New York State Museum & Science Service at Albany).

Remarks. This new species is related to **pectinatus**, n. sp. and **formosus**, n. sp. *S.* **communis**, n. sp. differs by having much shorter dorsal setae *d*, *e1*, *f1* and *f2* and caudal setae *h1* and *h2*. Also seta *s* of tibiotarsus I is shorter than *p* and *r*; these setae are equal in length in **pectinatus** and **formosus**.

Scutacarus (*Scutacarus*) **pedestris**, n. sp.
(Figures 45–48)

Female (*Holotype*). Idiosoma 146 μ long, 140 μ wide, elliptical.

Dorsum (fig. 45). Sensillus, capitate, spiculate(?); prodorsal setae *pd1* and *pd2* not seen. All dorsal setae barbed and short; *c1* as strong and as long as *c2*; *d* similar to *e1*, *f1* and *f2* except much shorter; *e2* fairly slender and short.

Venter (fig. 46). Coxisternal plates developed, thinly sclerotized, finely punctate. Apodeme 2 poorly developed, appearing as thin curved line joining acetabula of leg II. Apodeme 4 incomplete, as short lateral extensions of sternal apodeme (*apsp*); a small secondary apodeme present below *ap4*. Sternal apodeme (*apsp*) strong, extending posteriorly to acetabula of leg IV. Epimeral setae *1a* and *2a* large, plumose; *1b* small, sparsely plumose; *2b* saberlike, smooth; *3a* similar to *3b*, barbed; *4c* as stout as *4b* but shorter, barbed; *4a* very short, weak, simple; *4b* long, almost reaching posterior margin of hysterosoma. Caudal setae *h1* large, thickly feathered; *h2* slender, finely pectinate; *h3* short, weak, simple, distant; *h1* and *h2* approximate at their origins. Tibiotarsus of leg I as in figure 47. Solenidion ω_1 stout, as long as slender solenidion ω_2; φ_1 small, as long φ_2. Tarsus II solenidion ω_1 same form as ω_1 of tibiotarsus I except stouter and shorter. Tibia II and III solenidion φ_1 small, club-shaped, that on tibia slightly smaller. Leg IV as in figure 48. Tibiotarsus conical, longer than its basal width, with 7 setae. Seta *s* slightly shorter than *p* and *r*.

Male. Unknown.

Holotype. Female, Cooperstown, New York, August 26, 1973, taken from debris near base of a tree by M. D. Delfinado.

Paratypes. 2 females, with same data as holotype.

Remarks. The very short, weak and simple epimeral setae *4a*, the uniformly short dorsal setae of idiosoma, and the small solenidia φ_1 and φ_2 are characteristic of this new species.

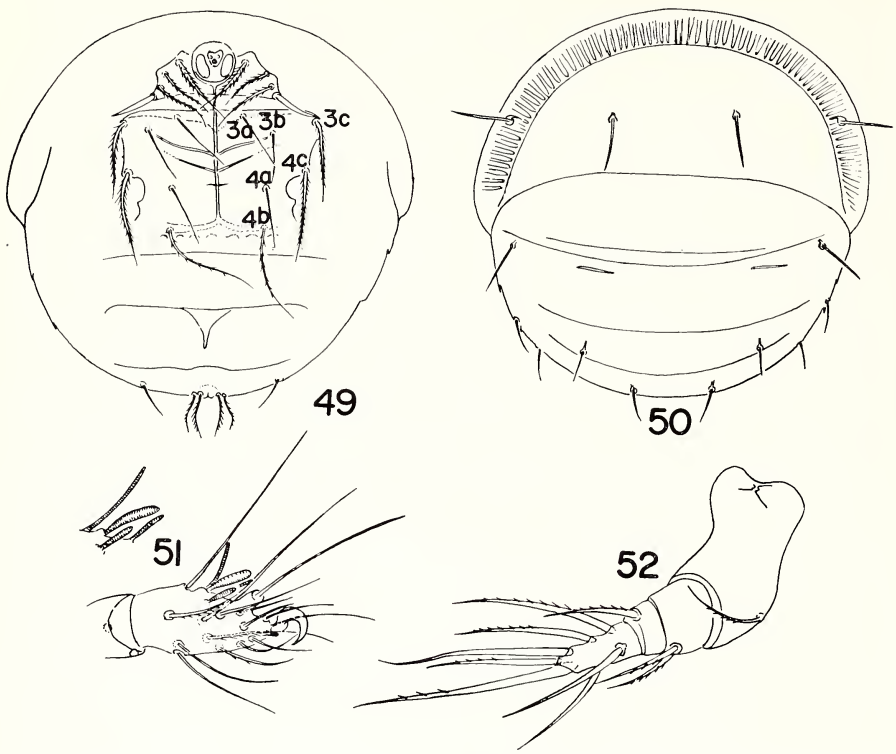
Scutacarus (*Scutacarus*) **notabilis** n. sp.
(Figures 49–52)

Female (*Holotype*). Idiosoma 140 μ long, 143 μ wide, elliptical.

Dorsum (fig. 50). Sensillus capitate, covered with spicules; prodorsal setae *pd1* and *pd2* minute, hardly discernible. All dorsal setae simple; *c1* and *c2* as long and as strong as *d*; *e1*, *e2*, *f1* and *f2* slender, uniformly short, shorter than *d*.

Venter (fig. 49). Coxisternal plates well sclerotized, punctate. Apodeme 2 poorly developed, connected to acetabula of leg II. Apodeme 4 strong, but faintly connected to acetabula of leg III. Sternal apodeme (*apsp*) strong, extending posteriorly to acetabula of leg IV. Epimeral setae *1a* large, serrate; *1b* similar to *2a* slender, barbed; *2b* saberlike, smooth; *3c* and *4c* strong, barbed; *4a* simple, about ⅔ as long as, and inserted anterior to *4b*; *4b* slightly longer than *4c*, barbed. Tibiotarsus of leg I as in figure 51, solenidion ω_2 short, slender; ω_1 stout, club-shaped; φ_2 very long, slender; φ_1 short, club-shaped, about ½ as long as φ_2. Tarsus II solenidion ω_1 as large as ω_1 of tibiotarsus I. Tibia II and III solenidion φ_1 not seen due to poor orientation of specimen. Leg IV as in figure 52. Leg setae mostly short, sparsely barbed or smooth. Tibiotarsus twice as long as its basal width, with 7 setae. Seta *s* shorter than *r* and *p*; seta *r* smooth.

Male. Unknown.



FIGS. 49–52. *Scutacarus* (*S.*) *notabilis*, n. sp. 49. Female venter. 50. Female dorsum. 51. Genu, tibiotarsus and solenidia of leg I. 52. Leg IV.

Holotype. Female, along stream bank, Ilion Gulf, Herkimer County, New York, August 5, 1974, taken from moss, *Drepanocladus*, sp. by M. D. Delfinado.

Paratype. 1 female, with same data as holotype. The moss was collected and identified by Mr. S. J. Smith.

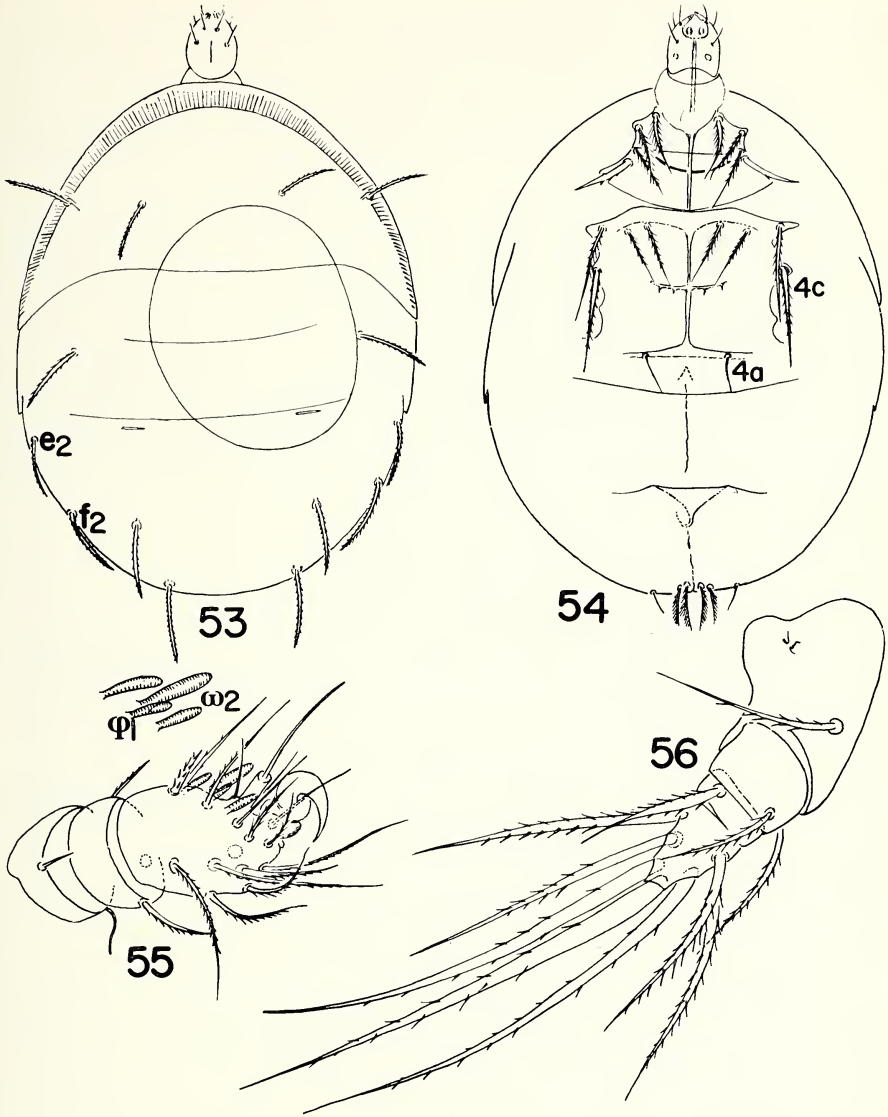
Remarks. This is a distinctive species in that all the dorsal setae on idiosoma are simple; the epimeral setae *4a* are displaced anterior to *4b*; the solenidion φ_2 is unusually long and slender, and the setae on the leg IV are mostly short.

Scutacarus (*Scutacarus*) **grosi**, n. sp.
(Figures 53–56)

Female (*Holotype*). Idiosoma 223 μ long, 179 μ wide, elongate elliptical.

Dorsum (fig. 53). Sensillus capitate, surface rough; prodorsal setae *pd1* and *pd2* strong, spinelike. All dorsal setae short, of uniform type and thickness, barbed.

Venter (fig. 54). Coxisternal plates sclerotized, minutely punctate. Apodeme 2 well developed, strong, joining acetabula of leg II. Apodeme 4 strong but incomplete; a small secondary apodeme present immediately below *ap4*. Sternal apodeme (*apsp*) complete,



Figs. 53–56. *Scutacarus* (*S.*) *grosi*, n. sp. 53. Female dorsum. 54. Female venter. 55. Genu, tibiotarsus and solenidia of leg I. 56. Leg IV.

posteriorly joining acetabula of leg IV. Epimeral setae *1a* similar to *1b* and *2a*, barbed; *2b* saberlike, with 1–3 median serrations; *3a* and *3b* as long and as strong as *3c*, barbed; *4c* very strong, barbed; *4a* small, simple; *4b* absent. Caudal setae *h1* as long as *h2*, feathered, approximate at their origins; *h3* simple, distinct. Tibiotarsus of leg I as in figure 55. Solenidion ω_2 short, as long as φ_2; ω_1 very large; φ_1 similar to ω_1 but smaller. Tarsus II

solenidion ω_1 large. Tibia II solenidion φ_1 larger than that on tibia III, club-shaped. Leg IV as in figure 56. Tibiotarsus longer than its basal width, with 7 setae. Seta *r* as long as *s* and *p* but *s* more robust.

Male. Unknown.

Holotype. Female, Heckscher Park, Long Island, New York, June 15, 1973, from leaf litter collected by M. D. Delfinado.

Paratypes. 1 female, same data as holotype and on same slide; 3 females, Rt. 87, Champlain Region, New York, August 15, 1973, from debris; 2 females, Newcomb, Adirondack Mts., August 27, 1973, from tree hole debris and rotten bark, all collected by M. D. Delfinado; 1 female, Patridge Run State Grant Area, New York, June 21, 1970, from nest of field sparrow collected by G. Eickwort.

Remarks. The presence of only 1 pair of posterior epimeral setae *4a* on the venter of the idiosoma relates *grosi*, n. sp. to *S. subterraneus* Oudemans and *S. spinosus* Storkan. But *grosi* differs from *subterraneus* by having 7 setae on tibiotarsus IV and complete posterior sternal apodeme (*apsp*); it is most easily recognized from *spinosus* by the large dorsal setae *e2* and *f2*; these setae are very small "spinelet" in *spinosus*.

Scutacarus (*Scutacarus*) **nearcticus**, n. sp.
(Figures 57–60)

Female (*Holotype*). Idiosoma 283 μ long, 313 μ wide, broadly elliptical.

Dorsum (fig. 57). Sensillus capitate, spiculate; prodorsal setae *pd1* and *pd2* large, spinelike, about as long as length of sensillus. Dorsal setae *c1* as long as *c2*, slender, barbed; *d* as long as *c1* but stronger, barbed; *f1* large, lanceolate, barbed; *e2* and *f2* similar to *f1* but much longer and thicker.

Venter (fig. 60). Coxisternal plates well sclerotized, punctate. Apodeme 2 well developed, joining acetabula of leg II. Apodeme 4 developed, with free ends approaching acetabula of leg IV; a small secondary apodeme present below *ap4*. Epimeral setae *1a*, *1b* and *2a* very strong, pectinate; *2b* large, saberlike, serrate; *3a* and *3b* slender, sparsely barbed; *3c* and *4c* strongest of epimeral setae, pectinate; *4a* slender, with sparse fine barbs; *4b* very long, slender, sparsely barbed, reaching posteriorly beyond margin of hysterosoma. Caudal setae *h1* and *h2* feathered, approximate at their origins; *h3* barbed, as long as *h1* and *h2*, distant. Tibiotarsus of leg I as in figure 59. Solenidion ω_2 long and slender; ω_1 stout, as long as ω_2; φ_1 same form as ω_2 but shorter; φ_2 slightly swollen, about as long as φ_1. Tarsus II solenidion ω_1 stouter and longer than that of tibiotarsus I. Tibia II solenidion φ_1 very small, peglike; that on tibia III not seen. Leg IV as in figure 58. Tibiotarsus twice as long as its basal width, with 7 setae. Seta *s* largest of leg IV setae.

Male. Unknown.

Holotype. Female, Plattsburgh, Champlain Region, New York, August 15, 1973, from humus collected by M. D. Delfinado.

Paratypes. 6 females, with same data as holotype; 4 females, Rt. 87, Champlain Region, August 15, 1973, from debris and moss on a tree trunk collected by M. D. Delfinado.

Remarks. This species most closely resembles *S. crassisetus simplex* (Paoli) from Florida but is readily distinguished by the barbed setae *e2* and *f2* and by the large, lanceolate, barbed setae *f1*. Also the epimeral setae *2b* are serrate, and the sensillus is spiculate.

Scutacarus (*Scutacarus*) **curtus**, n. sp.
(Figures 61–64)

Female (*Holotype*). Idiosoma 198 μ long, 198 μ wide, orbicular.

Dorsum (fig. 61). Sensillus capitate, with a few spicules; prodorsal setae *pd1* and *pd2* not seen. All dorsal setae short, barbed, approximately of same length; *c1*, *c2* and *d* heavier and stronger than others.

Venter (fig. 62). Coxisternal plates sclerotized, punctate. Apodeme 2 well developed and joined to acetabula of leg II. Apodeme 4 short, free; a weak secondary apodeme present below *ap4*. Sternal apodeme (*apsp*) free, not connected to acetabula of leg IV. Epimeral setae *1a* strong, pectinate; *1b* and *2a* less robust than *1a*, pectinate; *2b* saberlike, smooth; *3a* shorter than *3b*, sparsely barbed; *3c* as long as *3b*, strong, barbed; *4c* strongest of posterior epimeral setae, barbed; *4a* short, slender; *4b* about twice as long as *4a*, both sparsely barbed. Caudal setae *h1* and *h2* feathered, approximate at their origins; *h3* very small, simple, distant. Tibiotarsus of leg I as in figure 63. Solenidion ω_2 long, slender, straight; ω_1 stout, shorter than ω_2; φ_2 club-shaped, about as long as slender φ_1. Tarsus II solenidion ω_1 stouter than that of tibiotarsus I but shorter. Tibia II and III solenidion φ_1 small, club-shaped. Leg IV as in figure 64. Tibiotarsus slightly longer than its basal width, with 6 setae. Seta *r* very short, ¼ as long as *p*; *s* shorter than *p*.

Male. Unknown.

Holotype. Female, Mohawk River bank, Crescent, New York, October 4, 1973, from debris under a rotting log collected by M. D. Delfinado.

Paratype. Female, Plattsburgh, Champlain Region, August 15, 1973, from humus collected by M. D. Delfinado.

Remarks. The very short seta *r* on tibiotarsus of leg IV is characteristic for *S.* **curtus**, n. sp.

Genus *Imparipes* Berlese

Imparipes Berlese, 1904, Zool. Anz. 27: 22. Type-species, *Imparipes histricinus* (sic) Berlese, 1904, by monotypy.

This genus generally resembles *Scutacarus* but can easily be recognized by having 5-segmented leg IV: distinct tibia and tarsus; 5–6 setae on tarsus, and usually elongate pretarsus. Claws and empodium are usually present. Leg I is 4-segmented and may or may not have claws. Only the females are known.

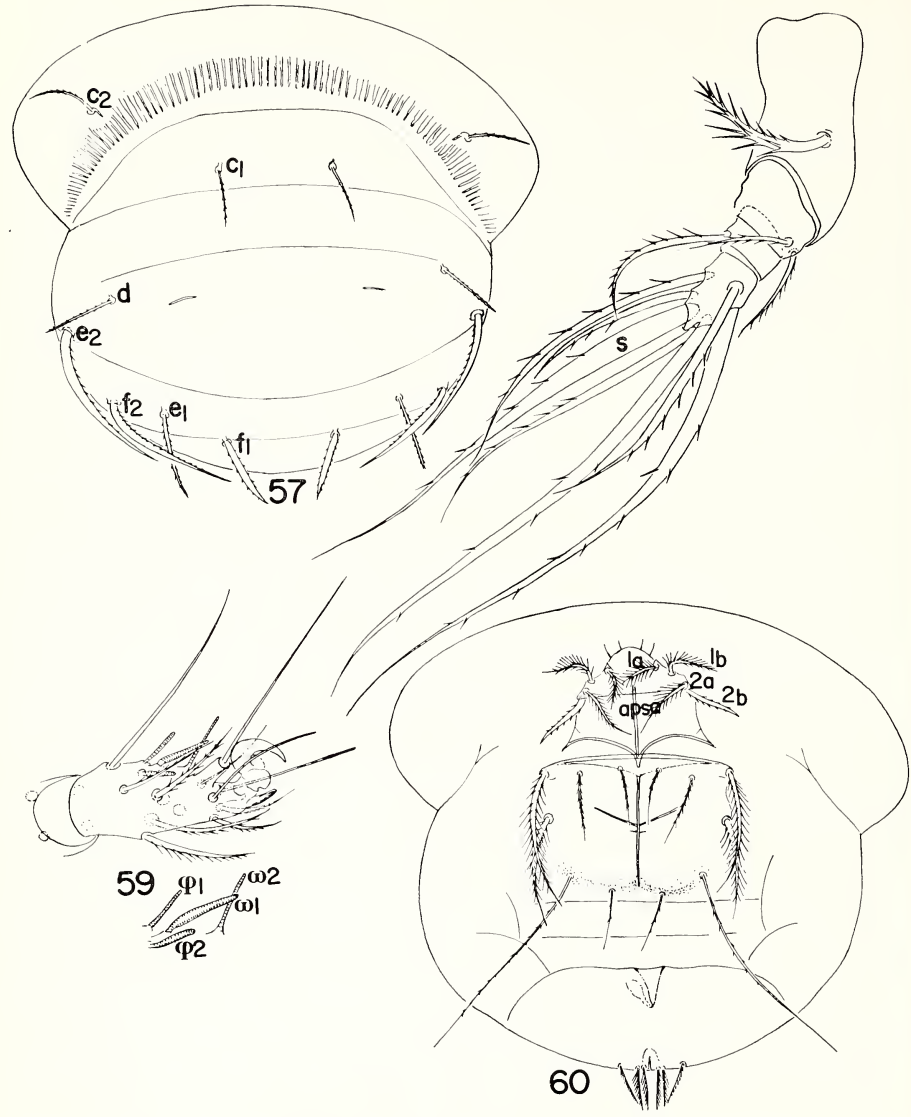
Three species have previously been reported from North America. Eight species and 2 subspecies are described herein, of which 8 are new.

Mahunka (1965) in his identification key of the genera of Scutacaridae recognized three subgenera of *Imparipes* based on what we believe to be trivial characters of tarsus IV. And because the use of subgeneric category, at present, is very confused and has little purpose except to clarify keys, we have not used subgenera of species groups in this paper.

Imparipes **longitarsus**, n. sp.
(Figures 65–68)

Female (*Holotype*). Idiosoma 236 μ long, 198 μ wide, obovate.

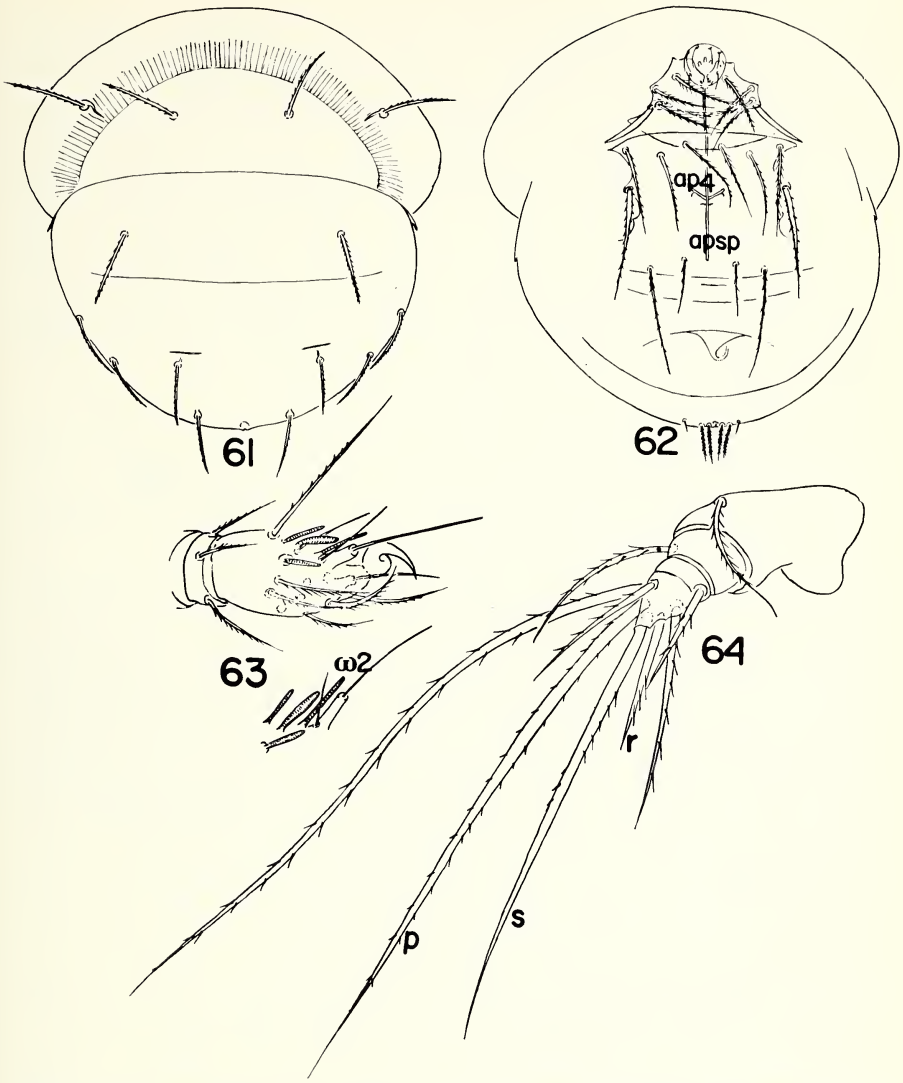
Dorsum (fig. 65). Sensillus capitate, with a few spicules; prodorsal setae spinelike, *pd1* larger and longer than *pd2*. All dorsal setae uniformly barbed. Setae *c1* as long as



FIGS. 57–60. *Scutacarus* (*S.*) *nearcticus*, n. sp. 57. Female dorsum. 58. Leg IV. 59. Tibiotarsus and solenidia of leg I. 60. Female venter.

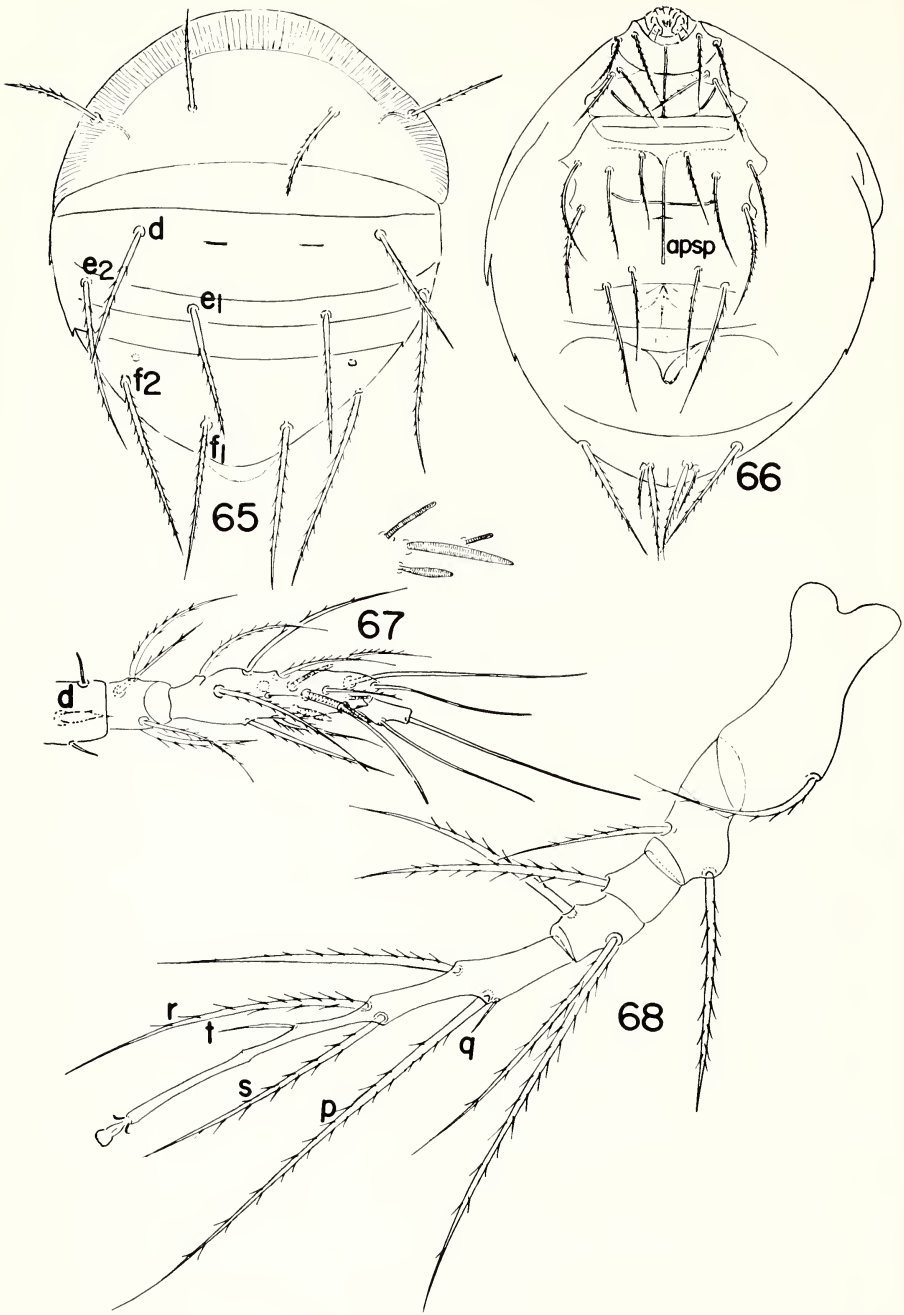
c2, strong; *d* as long *e1*, strong, longer than *c1* and *c2*; *e2* and *f1* as long as *f2*, longer than *d* and *e1*.

Venter (fig. 66). Coxisternal plates poorly sclerotized. Apodeme 2 developed, straight, joining acetabula of leg II. Apodeme 4 free, not joining acetabula of leg III. Posterior sternal apodeme (*apsp*) free. Epimeral setae *1a*, *1b* and *2a* slender, barbed; *2b* similar to



Figs. 61–64. *Scutacarus* (*S.*) *curtus*, n. sp. 61. Female dorsum. 62. Female venter. 63. Genu, tibiotarsus and solenidia of leg I. 64. Leg IV.

2a except stronger and sparsely barbed; *3a* similar to *3b* and *3c,* barbed, slender; *4a* slender, shorter than *4b*; *4b* as strong as *4c*, barbed, inserted slightly below *4a*. Caudal setae *h2* and *h3* very strong, as strong as dorsal setae, barbed; *h1* small, slender, barbed; *h1* and *h2* approximate at their origins; *h3* distant. Tibiotarsus of leg I as in figure 67, without claw. Solenidion ω_2 very small, peglike; ω_1 large, stout; φ_2 club-shaped; φ_1 slender, straight, slightly longer than φ_2. Seta *d* of femur developed as short, large spine, serrate distally. Tarsus II solenidion ω_1 same form as that of tibiotarsus I. Tibia II and



FIGS. 65–68. *Imparipes longitarsus*, n. sp. 65. Female dorsum. 66. Female venter. 67. Femur, genu, tibiotarsus and solenidia of leg I. 68. Leg IV.

III solenidion φ_1 club-shaped, that on tibia III shorter. Leg IV as in figure 68. Tarsus and pretarsus as long as length of trochanter, genu, femur and tibia together. Tarsus with 6 setae; *t* and *q* short, slender, spinelike; *r* as long as *s*, strong, barbed; *p* stronger and longer than *r* or *s*. Pretarsus about ⅓ as long as tarsus.

Male. Unknown.

Holotype. Female, Rt. 87, Lake Champlain, New York, August 15, 1973, from sphagnum moss collected by M. D. Delfinado.

Paratype. 1 female, with same data as holotype.

Remarks. This species is close to *I.* **similis**, n. sp. but can be readily distinguished by the very small, peglike solenidion ω_2 of tibiotarsus I, and by the serrate seta *d* on femur I. In **similis**, solenidion ω_2 is very long and slender, and seta *d* is simple.

Imparipes **similis**, n. sp.
(Figures 69–71)

Female (*Holotype*). Idiosoma 262 μ long, 223 μ wide, elliptical.

Dorsum. Sensillus capitate, spiculate; prodorsal setae spinelike, *pd1* stronger than *pd2*. Dorsal chaetotaxy and type of setae as in **longitarsus**, n. sp.

Venter. Coxisternal plates well sclerotized, finely punctate. Apodeme 2 developed, curved, joining acetabula of leg II. Apodeme 4 well developed, straight, joining acetabula of leg III. Sternal apodeme (*apsp*) strong, with posterior end faintly joining posterior margin of coexisternal plate. All epimeral setae *1a, 1b, 2a* and *2b* slender, barbed; *2b* not different from other setae; *3a*, *3b* and *3c* similar to *2b* except the former stronger; *4a* slender, sparsely barbed, inserted anterior to *4b; 4b* about as strong as *4c*, barbed. Caudal setae *h1* and *h3* strong, barbed; *h2* small, simple; *h1* and *h2* approximate at their origins; *h3* distant. Tibiotarsus of leg I as in figure 69, without claw. Solenidion ω_2 very long and slender; ω_1 large, tapered distally; φ_2 club-shaped; φ_1 long and slender, shorter than ω_2. Seta *d* of femur as large simple spine. Tarsus II solenidion ω_1 same as that on tibiotarsus I. Tibia II and III solenidion φ_1 club-shaped, about same size. Leg IV as in figure 70. Tarsus and pretarsus long and slender, as long as length of trochanter, genu and femur together. Tarsus with 6 setae; *t* and *q* short, slender, spinelike; *r* as long as *s*, barbed; *p* much stronger than *r* or *s*, barbed. Pretarsus about ½ as long as tarsus.

Male. Unknown.

Holotype. Female (unique), Crescent, Mohawk Valley, October 4, 1973, from rotten log near river collected by M. D. Delfinado.

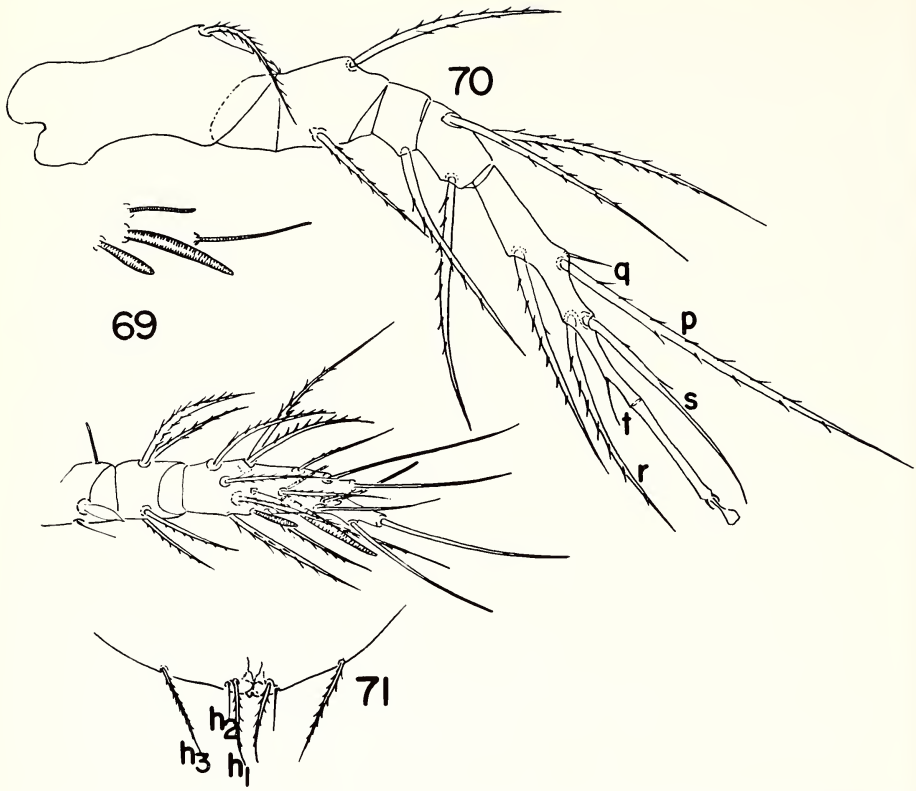
Remarks. *I.* **similis** is distinctive by having very long, slender solenidion ω_2; well developed apodeme 4, and simple caudal setae *h2* and seta *d* of femur I.

Imparipes **tarsalis**, n. sp.
(Figures 72–75)

Female (*Holotype*). Idiosoma 160 μ long, 127 μ wide, ovoid.

Dorsum (fig. 72). Sensillus capitate, spiculate(?); prodorsal setae *pd1* and *pd2* not seen. All dorsal setae simple except *f1*. Setae *c1* as long as *c2*, fairly long, slender; *e2* shorter than *e1*, weak; *d* as long as *e1* and *f2*; *f1* longer than *f2*, fairly strong, barbed at middle.

Venter (fig. 73). Coxisternal plates well sclerotized, posterior plate expanded laterally beyond acetabula of leg IV, finely punctate. Apodeme 2 developed, curved, joining ace-

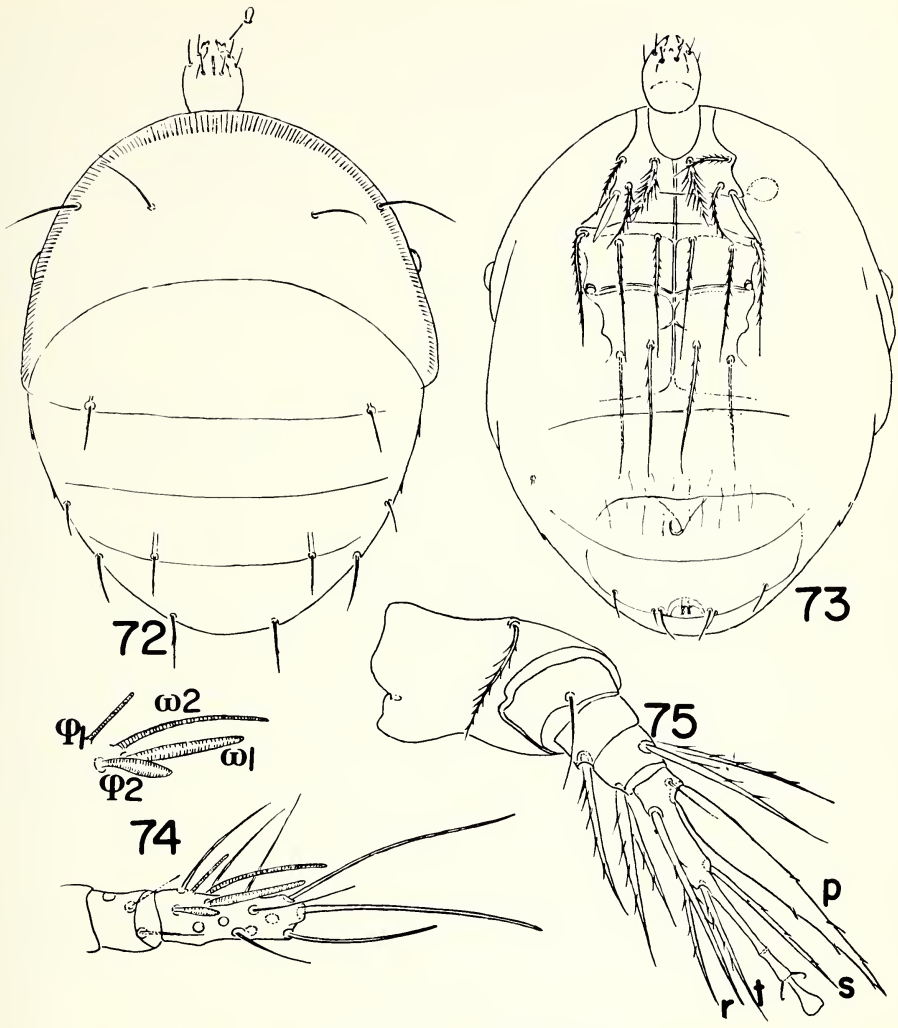


FIGS. 69–71. *Imparipes similis,* n. sp. 69. Femur, genu, tibiotarsus and solenidia of leg I. 70. Leg IV. 71. Caudal setae *h1*, *h2* and *h3*.

tabula of leg II. Apodeme 4 strongly developed, joining acetabula of leg III; a small secondary apodeme present below *ap4*. Sternal apodeme (*apsp*) free. Epimeral setae *1a* large, strongly developed, pectinate; *1b* small, barbed; *2a* similar to *1b* except stronger; *2b* large, daggerlike, smooth; *3a, 3b* and *3c* similar to *4a,* strong, long and barbed; *4b* and *4c* missing. All caudal setae simple; *h2* very short, ½ as long as *h1*; *h3* similar to *h1*, distinct; *h1* and *h2* approximate at their origins. Tibiotarsus of leg I as in figure 74, without claw. Solenidion ω_2 very long, slender, curved; ω_1 stout, straight, shorter than ω_2; φ_1 short, slender, about ½ as long as ω_2; φ_2 club-shaped. Solenidia on tarsus II and tibia II and III not seen due to poor orientation of specimen. Leg IV as in figure 75. Tarsus and pretarsus as long as length of trochanter, genu, and femur. Pretarsus very short, about ⅕ as long as tarsus. Tarsus with 6 setae; seta *t* same type as *r* and *s*, not spinelike; seta *p* immensely developed, lanceolate, serrate distally; *q* short, hairlike.

Male. Unknown.

Holotype. Female (unique), Sunken Meadow State Park, Smithtown Bay, Long Island, New York, June 25, 1973, from a tree hole debris collected by M. D. Delfinado and M. J. Abbatiello.

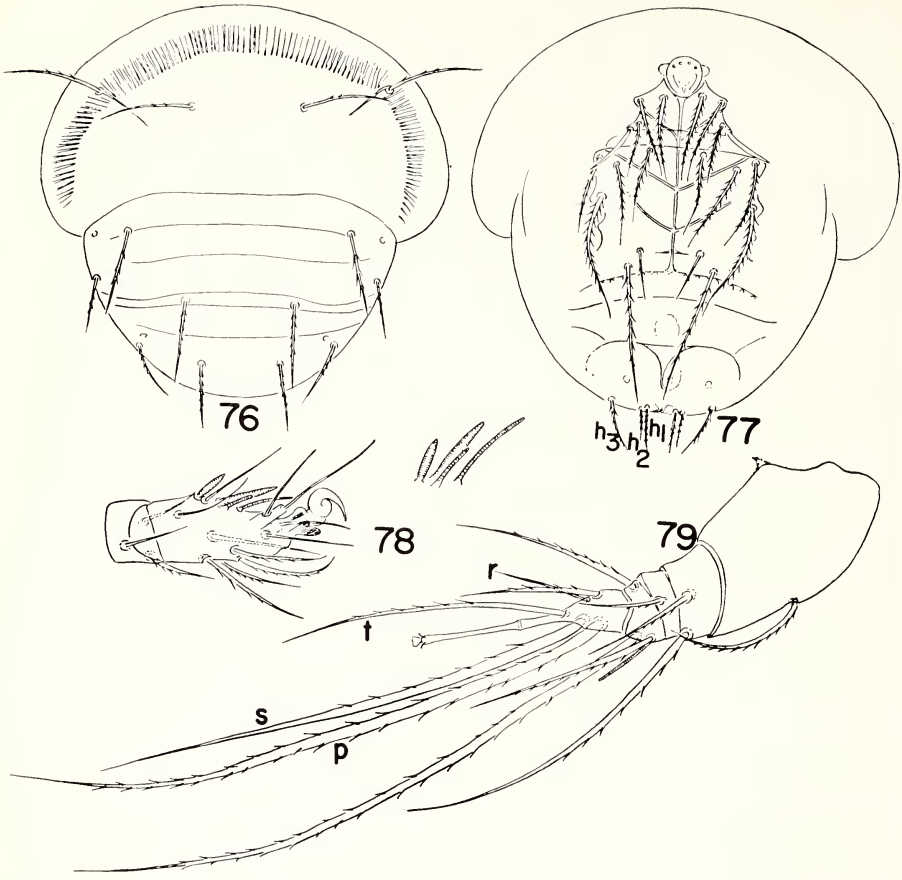


Figs. 72–75. *Imparipes tarsalis*, n. sp. 72. Female dorsum. 73. Female venter. 74. Genu, tibiotarsus and solenidia of leg I. 75. Leg IV.

Remarks. This species falls into the group that has no claw on leg I. *I.* **tarsalis**, n. sp. is distinguished from the other species in having the seta *p* immensely developed and the epimeral setae *2b* large and daggerlike; also it has the pretarsus very short and seta *t* the same type as *r* or *s*.

Imparipes degenerans italicus Berlese
(Figures 76–79, 84)

Imparipes degenerans var. *italicus* Berlese, 1904, Redia 2: 10. Rack, 1966, Adh. Verh. Naturwiss, Ver. Hamb. 10: 100, figs. 2–4.



FIGS. 76–79. *Imparipes degenerans italicus* Berlese. 76. Female dorsum. 77. Female venter. 78. Genu, tibiotarsus and solenidia of leg I. 79. Leg IV.

Female. Idiosoma 243 μ long, 274 μ wide, obovate, much broader anteriorly.

Dorsum (fig. 76). Sensillus capitate, spiculate; prodorsal setae *pd1* very large and strong, as long as sensillus; *pd2* about ½ as long as *pd1*. Setae *c1* and *c2* slender, longer than posterior dorsal setae, barbed; *d* as long as *e1*, *e2*, *f1* and *f2*, strong, barbed.

Venter (fig. 77). Coxisternal plates well sclerotized, finely punctate. All apodemes strongly developed. Apodemes 2 and 4 complete. Sternal apodeme (*apsp*) joined posteriorly to margin of coxisternal plate. Epimeral setae *1a* stronger than *1b* and *2a*, barbed; *2b* dagger-like, smooth; *3b* longer than *3a* and *3c*, barbed; *4a* short, about ½ as long as and inserted anterior to *4b*, sparsely barbed or may be simple; *4c* as long as *4b* but stronger. Caudal setae (fig. 84) *h1*, *h2* and *h3* sparsely barbed; *h1* shorter than *h2*; *h3* longer and stronger *h2* distant. Tibiotarsus of leg I as in figure 78, with a claw. Solenidion ω_2 long and slender; ω_1 stout, tapered distally, shorter than ω_2; φ_2 short, slender, about as long as φ_1; φ_1 stout, club-shaped. Tarsus II solenidion ω_1 same form as that on tibiotarsus I

except slightly smaller. Tibia II and II solenidion φ_1 slender, characteristically club-shaped, that on tibia III much longer, about as long as length of tibia. Leg IV as in figure 79, with a small solenidion on tibia. Tarsus and pretarsus about as long as length of trochanter and genu together. Pretarsus as long as tarsus. Tarsus with 5 setae; seta *r* weak, short and simple.

Specimens examined. 5 females, near MacArthur Airport, Islip, Long Island, New York, July 16, 1973, from pine debris collected by M. D. Delfinado and M. J. Abbatiello.

Remarks. This species appears to be fairly common in Europe. It differs from the typical *degenerans* Berlese by the type and size of seta *t* on tarsus IV; this seta is much thinner and shorter in the type form as shown by Berlese (1904b) and Rack (1965).

Imparipes degenerans nearcticus, n. subsp.
(Figures 80–83)

Female (*Holotype*). Idiosoma 325 μ long, 268 μ wide, obovate.

Dorsum (fig. 80). Sensillus (fig. 82) capitate, spiculate; prodorsal setae *pd1* stout; *pl2* small, about ½ as long as *pd1*. Type of dorsal setae as in *degenerans italicus* Berlese except: *d, e1, e2, f1* and *f2* slightly longer, and *c1* shorter than *c2*.

Venter (fig. 81). Essentially as in *d. italicus*. Setae *4a* simple (or with 1–2 fine barbs in paratype specimens). Caudal setae (fig. 83) *h1, h2* and *h3* long and well differentiated from other setae, short plumose. Legs I and IV as in *d. italicus*.

Male. Unknown.

Holotype. Female, pine grove on Rt. 9W, New Baltimore, New York, July 16, 1974, from pine debris collected by M. D. Delfinado.

Paratypes. 14 females, with same data as holotype; 1 female, Rt. 87, 36 mi. north of New York City, July 22, 1973, from litter; 2 females, Palisades Park, New Jersey, from oak litter; 10 females, Stafford, Virginia, July 3, 1973, from mixed forest litter collected by E. W. Baker. The New York and New Jersey material were collected by M. D. Delfinado.

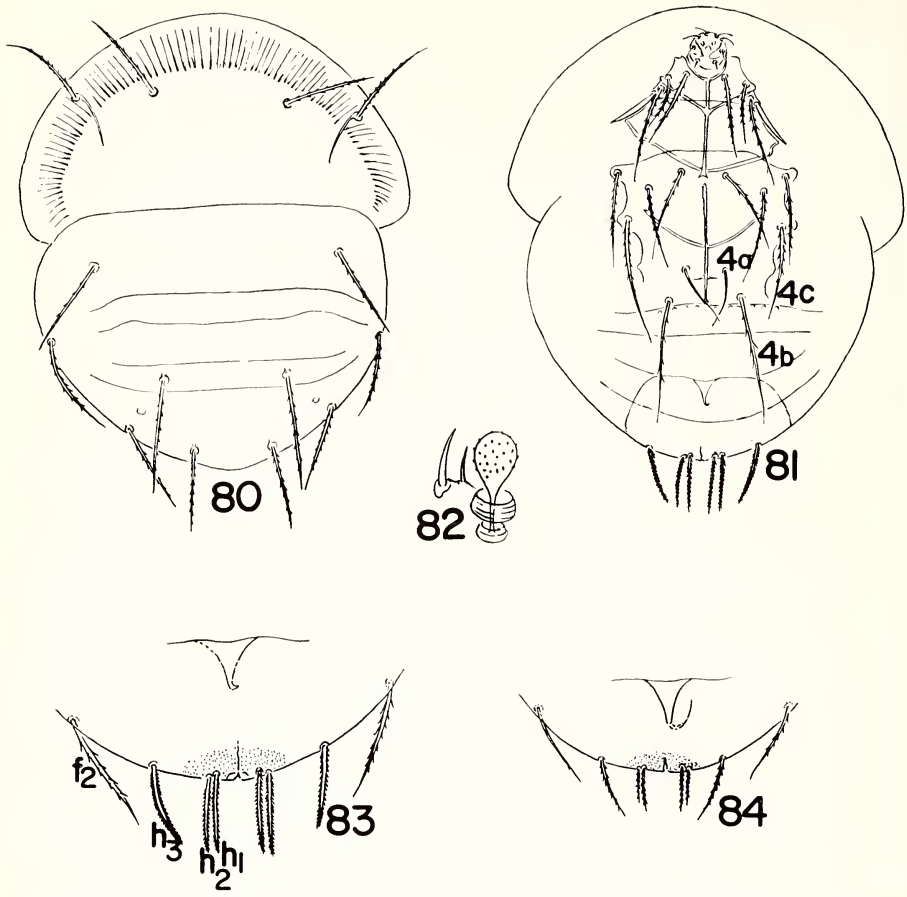
Remarks. This subspecies primarily differs from the type form and *d. italicus* Berlese by the characteristic development of the caudal setae (fig. 83); in the type form and *d. italicus*, the corresponding setae are unequal and sparsely barbed.

Imparipes **insulanus**, n. sp.
(Figures 85–88)

Female (*Holotype*). Idiosoma 223 μ long, 217 μ wide, elliptical.

Dorsum (fig. 85). Sensillus capitate, spiculate; predorsal setae *pd1* and *pd2* spinelike, hardly discernible. Setae *c1* and *c2* shorter than most posterior setae; *d*, *e1* and *e2* shorter than *f1* and *f2*; all dorsal setae strong and barbed.

Venter (fig. 86). Coxisternal plates well sclerotized, finely punctate. All apodemes well developed, strong. Apodeme 2 complete, straight, joining acetabula of leg II. Apodeme 4 with ends faintly connected to acetabula of leg III. Posterior sternal apodeme (*apsp*) free. Epimeral setae *1a* stronger than *1b* and *2a*, barbed; *2b* not much differentiated from others, as strong as *1a* except shorter; *3a* slender, simple, inserted anterior to *3b*; *3b* lanceolate, straddling on apodeme 4, smooth; *3c* slender, barbed; *4a* similar to *3b*, lanceolate;

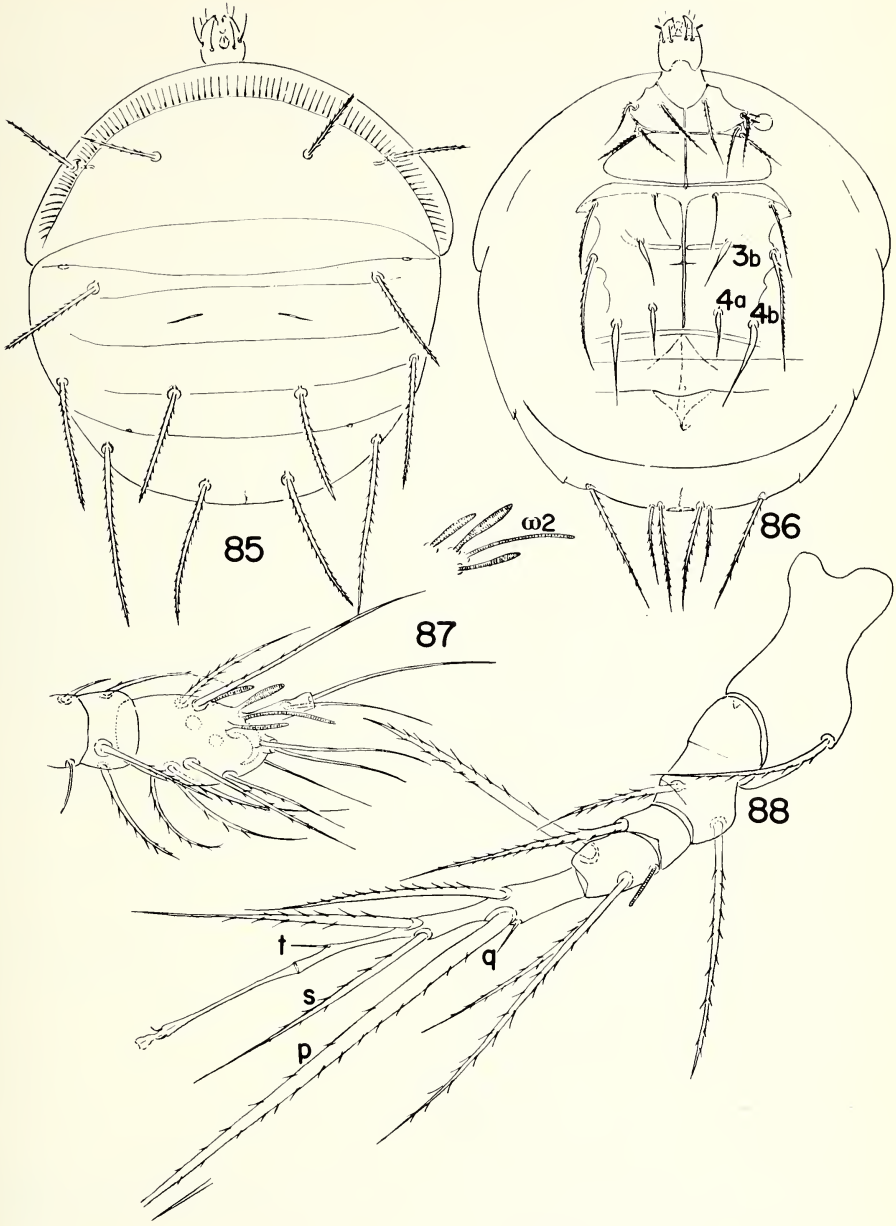


FIGS. 80–83. *Imparipes degenerans nearcticus*, n. subsp. 80. Female dorsum. 81. Female venter. 82. Sensillus and prodorsal setae *pd1* and *pd2*. 83. Caudal setae *h1*, *h2* and *h3*.
FIG. 84. Caudal setae *h1*, *h2* and *h3* of *Imparipes d. italicus* Berlese.

4b similar to *4a* except much longer; *4c* barbed, longer than *3c*. All caudal setae barbed and strong; *h1* longer than *h2*; *h3* longer than *h1*, distant. Tibiotarsus I as in figure 87, without a claw. Solenidion ω_2 very long, slender; ω_1 large, club-shaped, shorter than ω_2; φ_2 slender, almost straight; φ_1 club-shaped, about as long as φ_2. Leg IV as in figure 88, with a small solenidion on tibia. Tarsus and pretarsus as long as length of trochanter, genu, femur and tibia together. Pretarsus ½ as long as tarsus. Tarsus with 6 setae; setae *t* and *q* very small, as short, weak spines; *r* and *s* equal in length, hardly reaching tip of empodium.

Male. Unknown.

Holotype. Female, Robert Moses State Park, Great South Bay, Long Island, New York, June 14, 1973, from mixed plant litter collected by M. D. Delfinado and M. J. Abbatiello.



Figs. 85–88. *Imparipes insulanus*, n. sp. 85. Female dorsum. 86. Female venter. 87. Genu, tibiotarsus and solenidia of leg I. 88. Leg IV.

Paratype. 4 females, with same data as holotype. (Note. 2 paratype specimens are smaller than holotype, measuring 191 μ long, 185 μ wide.)

Remarks. *I.* **insulanus**, n. sp. is remarkably close to *I. minor* Karafiat from Germany. Both species have the same type of setae and pattern on the venter of idiosoma and leg IV. *I.* **insulanus**, however, is most easily distinguished in having all dorsal and caudal setae barbed.

Imparipes **humilis**, n. sp.
(Figures 89–93)

Female (*Holotype*). Idiosoma 160 μ long, 160 μ wide, elliptical.

Dorsum (fig. 90). Sensillus capitate, spiculate; prodorsal setae spinelike, *pd1* longer than *pd2*. All dorsal setae long and strong, barbed; *c1* and *c2* as long as *e2*, *f1* and *f2*; *d* longest of dorsal setae, more than ½ length of idiosoma; *e1* longer than *e2*, *f1* and *f2*.

Venter (fig. 89). Coxisternal plates well sclerotized, finely punctate. Apodemes well developed, strong. Apodeme 2 developed, joining acetabula of leg II. Apodeme 4 short, free, not joining acetabula of leg III. Sternal apodeme (*apsp*) joining posteriorly to acetabula of leg IV. Epimeral setae *1a*, *1b* and *2a* slender, barbed; *2b* large, daggerlike, barbed; *3a* shorter than *3b* and *3c*, slender, barbed; *4a* shorter than, and inserted anterior to *4b*; *4b* similar to *4c*, strong. Caudal setae *h1* as strong as *h3*, barbed; *h1* small, simple. Tibiotarsus of leg I as in figure 92, with a claw. Solenidion ω_2 shorter than ω_1, slightly swollen; ω_1, club-shaped; φ_2 long, slender, rodlike; φ_1, small, slender, capitate. Tarsus II and tibia III solenidia not seen due to poor orientation of specimen. Leg IV as in figure 93, with a small solenidion on tibia. Tarsus and pretarsus as long as length of trochanter, genu, femur and tibia together. Pretarsus as long as tarsus. Tarsus with 5 setae; *r* very short, simple; *t* and *s* not reaching beyond empodium.

Male. Unknown.

Holotype. Female, Colonie, 2 mi. west of airport, Albany County, New York, April 10, 1973, from forest humus collected by M. D. Delfinado.

Paratypes. 2 females, with same data as holotype (1 paratype measuring 204 μ long, 166 μ wide).

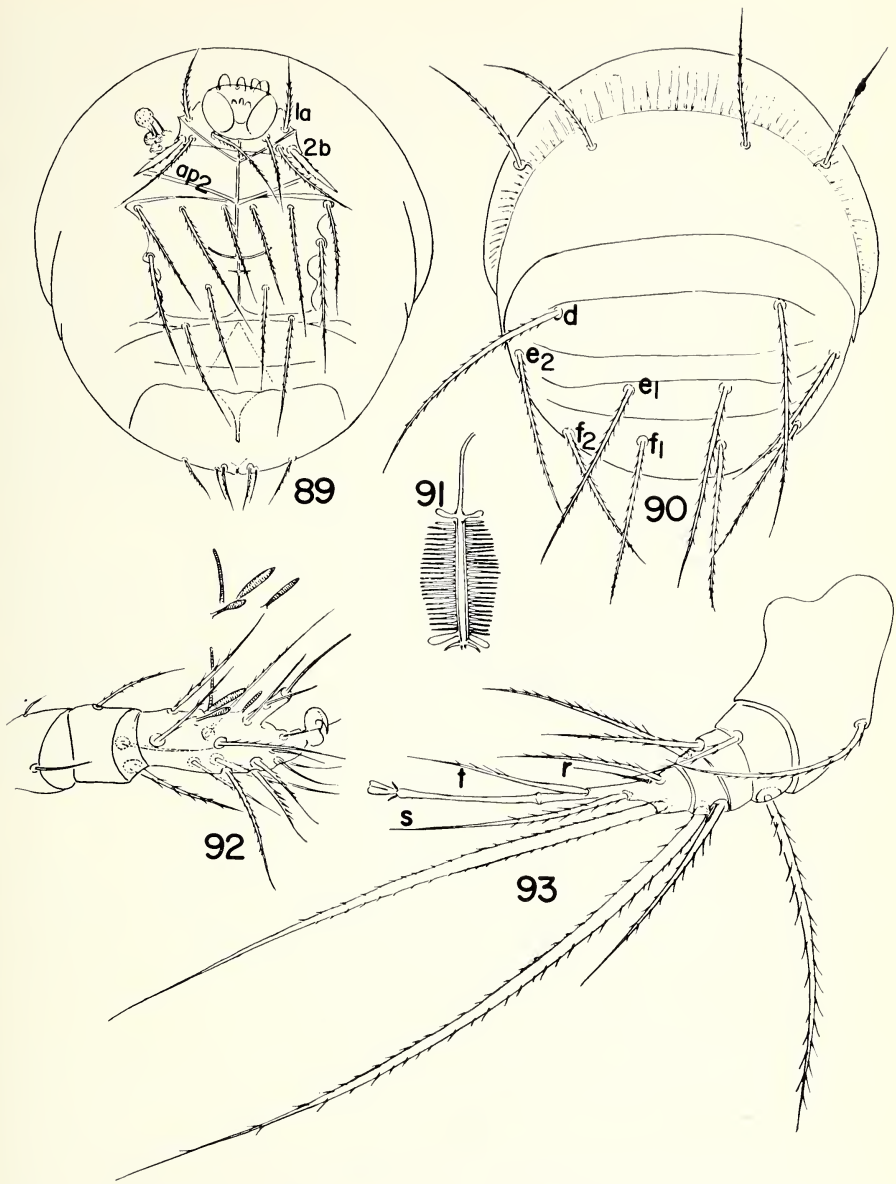
Remarks. This species is quite distinctive in having only 5 setae on tarsus IV (seta *q* missing), and barbed daggerlike epimeral setae *2b*; also solenidion ω_2 on tibiotarsus I is well differentiated from that of other species.

Imparipes **parapicola**, n. sp.
(Figures 94–97)

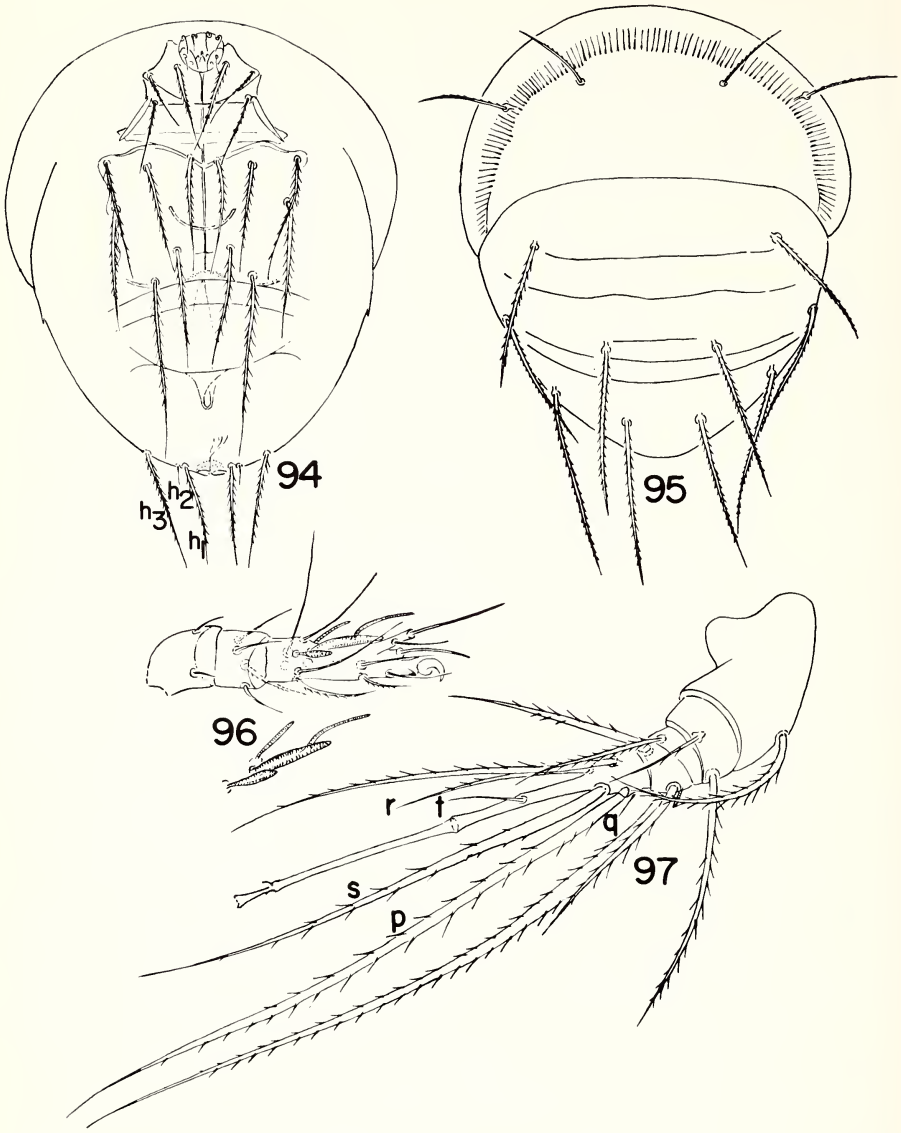
Female (*Holotype*). Idiosoma 191 μ long, 159 μ wide, obovate.

Dorsum (fig. 94). Sensillus capitate, spiculate; prodorsal setae *pd1* and *pd2* very small. All dorsal setae robust and barbed; *c1* as long as *c2*, shorter and less robust than posterior setae; *d*, *e1*, *e2*, *f1* and *f2* equally long.

Venter (fig. 95). Coxisternal plates well developed, punctate. Apodemes strong. Apodeme 2 complete. Apodeme 4 short, free, not joining acetabula of leg III; a small secondary apodeme present below *ap4*. Sternal apodeme (*apsp*) posteriorly faintly connected to acetabula of leg IV. All epimeral setae barbed except *2b*; *1a* stronger than *1b* and *2a*;



Figs. 89–93. *Imparipes humilis*, n. sp. 89. Female venter. 90. Female dorsum. 91. Pharyngeal armature(?). 92. Genu, tibiotarsus and solenidia of leg I. 93. Leg IV.



FIGS. 94–97. *Imparipes parapicola*, n. sp. 94. Female venter. 95. Female dorsum. 96. Femur, genu, tibiotarsus and solenidia of leg I. 97. Leg IV.

2b saberlike, smooth; *3a* similar to *3b* and *3c*, strong, barbed; *4a* shorter than *4b* and *4c*, inserted above *4b*; *4b* long, reaching posterior margin of hysterosoma. Caudal setae *h1* and *h3* strong, long and barbed, same thickness; *h2* very small, simple. Tibiotarsus of leg I as in figure 96, with a claw. Solenidion ω_2 long and slender; ω_1 large, tapered distally; φ_2 same form as ω_2 except shorter; φ_1 small, club-shaped. Tarsus II solenidion

ω_1 same form as that of tibiotarsus I except smaller. Tibia II and III solenidion φ_1 club-shaped, about same size. Leg IV as in figure 97, with a small solenidion on tibia. Tarsus and pretarsus much longer than length of trochanter, genu, femur and tibia together. Pretarsus as long as tarsus. Tarsus with 6 setae; seta *q* very small, simple ½ as long as *t*; *r* short, simple, reaching basal ⅓ of pretarsus.

Male. Unknown.

Holotype. Female, Sunken Meadow State Park, Smithtown Bay, Long Island, New York, June 26, 1973, from tree hole debris collected by M. D. Delfinado and M. J. Abbatiello.

Paratypes. 6 females, with same data as holotype; 2 females, Cross Island Parkway, Little Neck Bay, Long Island, New York, from plant litter on roadside; 1 female, Sacandaga, Adirondack Mts., New York, September 12, 1973, from forest humus. All collected by M. D. Delfinado.

Remarks. This species differs from *I. apicola* (Banks) from Ontario in having well differentiated solenidia ω_1 and φ_2 (fig. 96), and thickly barbed epimeral setae. In *apicola*, the corresponding solenidia are of the same size and form, and the epimeral setae are sparsely barbed.

Imparipes apicola (Banks), new combination

Disparipes apicola Banks, 1914, Jour. Ent. & Zool. 6: 61.

Scutacarus apicola, Mahunka, 1965, Acta Zool. Acad. Sci. Hung. 11: 383.

Mahunka (1965) listed *apicola* in combination with *Scutacarus* as *species inquirenda*. We have examined the type of *apicola*; it distinctly belongs to the genus *Imparipes*. At present, we have no specimens of this species from New York.

Imparipes obsoletus Rack
(Figures 98–102)

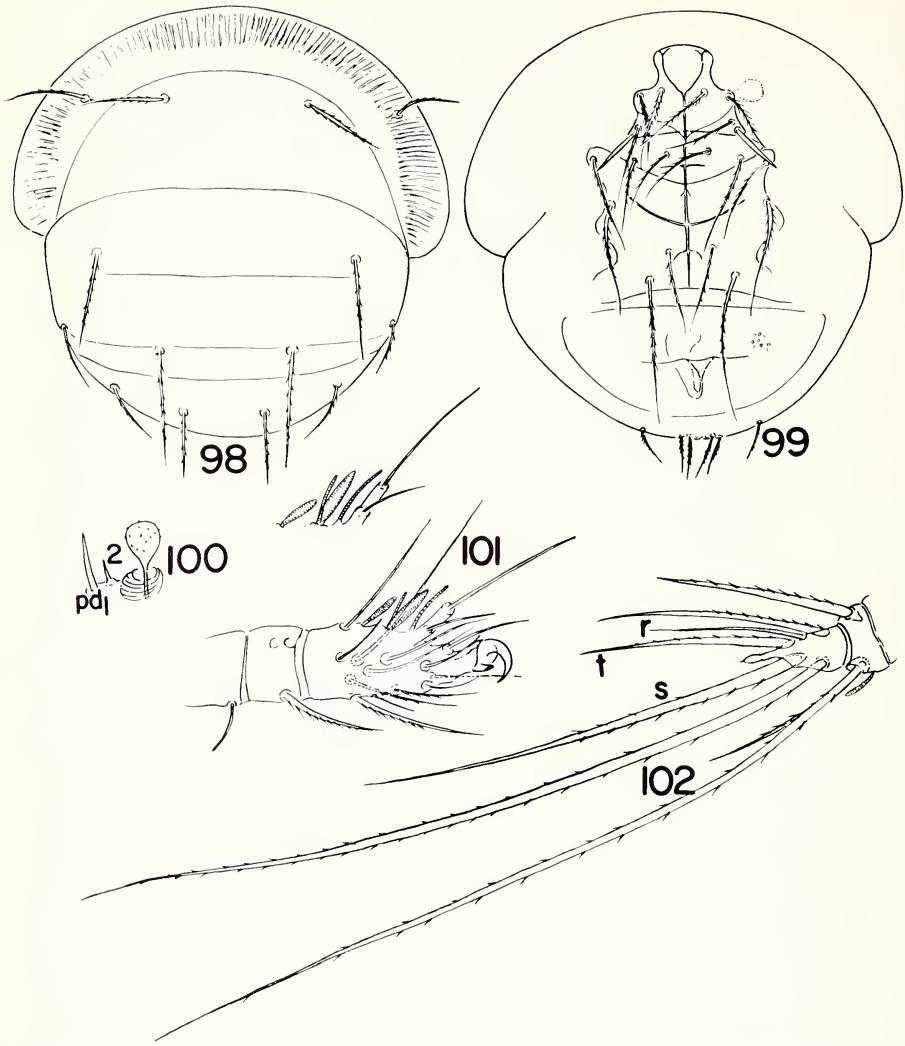
Imparipes (*I.*) *obsoletus* Rack, 1965, Abh. Verh. Naturwiss. Ver. Hamb. 10: 99 (n. n. for *Imparipes hystricinus degenerans* of Paoli, 1911, misidentification, not Berlese, 1904).

Imparipes (*I.*) *hystricinus degenerans* of Paoli, 1911, Redia 7: 259, figs. 57, 58, 60.

Female. Idiosoma 223 μ long, 223 μ wide, elliptical.

Dorsum (fig. 98). Sensillus capitate, spiculate (fig. 100); prodorsal setae spinelike, *pd1* large, strong, *pd2* very small. All dorsal setae barbed; *c1* as long as *c2*, shorter than *d* and *e1*, strong; *d* as long as *e1*, longest and strongest of dorsal setae; *e2* as long as *f1* and *f2*, short.

Venter (fig. 99). Coxisternal plates well sclerotized, finely punctate. Apodemes 2 and 4 complete, connected to acetabula of legs II and III respectively; a small secondary apodeme present below *ap4*. Sternal apodeme with posterior end free. All epimeral setae barbed except *2b*; *1a* similar to *2a*, stronger than *1b*; *2b* daggerlike, smooth; *3a* shorter than *3b* and *3c*, slender; *4a* shorter than and inserted anterior to *4b*; *4b* long, reaching posterior margin of hysterosoma. Caudal setae *h1* and *h2* as long as *h3*, finely barbed; *h1* and *h2* approximate at their origins; *h3* distant. Tibiotarsus of leg I as in figure 101, with a claw. Solenidion ω_2 long and slender, about as long ω_1; ω_1 stout, tapered



FIGS. 98–102. *Imparipes obsoletus* Rack. 98. Female dorsum. 99. Female venter. 100. Sensillus and prodorsal setae *pd1* and *pd2*. 101. Genu, tibiotarsus and solenidia of leg I. 102. Leg IV.

distally; φ_2 slender, about as long as φ_1; φ_1 club-shaped. Tarsus II solenidion ω_1 as large as that on tibiotarsus I. Tibia II and III solenidion φ_1 long, paddle-shaped, same size. Tibia and tarsus of leg IV as in figure 102, without claws and empodium; with a club-shaped solenidion on tibia. Pretarsus very short, bearing a minute spine at tip. Tarsus and pretarsus shorter than length of trochanter. Tarsus with 5 setae; seta *r* simple, shorter than *t*.

Male. Unknown.

Material examined. 2 females, Farmingdale, Long Island, New York, June 30, 1973, from a bird nest; 5 females, near Bolton Landing, Adirondack Mts., New York, August 18, 1973, from soil near base of a tree; 2 females, Oceanside Marine Study Area, Nassau County, Long Island, New York, June 18, 1973, from debris; 1 female, Palisades, New Jersey, June 24, 1973, from oak leaf litter. All collected by M. D. Delfinado.

Remarks. This mite is probably the species reported from Florida as *Imparipes* (*I.*) *hystricinus degenerans* Berlese by Paoli (1911:259). At first glance it appears typical of genus *Imparipes*. The absence of claws and empodium on leg IV is a striking characteristic of *I. obsoletus*.

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